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Official Proceedings
OF THE
Western Railway Club
FOR THE
Club Year 1908-1909

The Club meets the third Tuesday of each month, except June, July and August.
The Club Year ends with the meeting in May.

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WESTERN RAILWAY CLUB

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OFFICIAL PROCEEDINGS
OF THE
WESTERN RAILWAY CLUB

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Chicago, September 15, 1908

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The regular meeting of the Western Railway Club was held at the Auditorium Hotel, Tuesday evening, September 15, 1908, President M. K. Barnum in the chair. The meeting was called to order at 8:30 P. M. The following members registered:

Albert, C. J.	Furry, W. S.	Maus, N. R.
Barnes, C. A.	Gifford, Chas.	Midgley, S. W.
Barnum, M. K.	Gilmore, F. M.	Mills, G. F.
Bendixen, J. W.	Goodnow, T. H.	Monroe, M. S.
Borrowdale, J. M.	Goodwin, G. S.	Moody, W. O.
Breitenstein, J. F.	Graves, F. W.	Nathan, C. A.
Breneman, H. N.	Graves, R. I.	Osmer, J. E.
Bryant, G. H.	Hahn, F. W.	Parker, P.
Callahan, J. P.	Harkness, F. L.	Peck, P. H.
Carlton, L. M.	Harsha, B. R.	Pratt, C. W.
Carroll, J. T.	Henderson, T. D.	Rehm, N. F.
Chadwick, A. B.	Hennessey, J. J.	Rowley, S. T.
Chisholm, J. E.	Hetzler, H. G.	Rutherford, F. H.
Clark, F. H.	Hincher, W. W.	Ryder, G. E.
Clark, R. B., Jr.	Holcomb, W. B.	Schlegell, F. von
Connors, J. L.	Hopkins, L. A.	Schraag, C. F.
Coolidge, F. J.	Jeffries, B. H.	Scotfield, W. C.
Cooper, G. A.	Jenks, C. D.	Silk, E. E.
Cota, A. J.	Jett, E. E.	Simons, J. E.
Cunningham, J. B.	Johnson, Chas. H.	Smith, W. R.
Curtis, J. J.	Keeler, B. A.	Snead, J. M.
Deming, H. V.	Keeler, Sanford	Squire, F. G.
Derby, W. A.	Kendig, R. B.	Squire, W. C.
DeVoy, J. F.	Kucher, T. N.	Symons, W. E.
Dewar, John	Lancaster, J. R.	Taft, R. C.
Dodd, T. L.	LaQuay, M.	Taylor, J. W.
Dolly, J. M.	LaRue, H.	Tawse, W. G.
Doran, H. G.	Lee, E. H.	Tobias, C. H.
Elliott, J. J.	Lewis, J. H.	Towsley, C. A.
Endsley, L. E.	Libkeman, W. A.	Willcoxson, W. G.
Fanton, Wm. F.	Lickey, T. G.	Winn, C. F.
Finnell, H. W.	Lovell, Alfred.	Woods, E. S.
Flavin, J. T.	Lovell, C. P.	Woods, J. D.
Forsyth, Wm.	McAlpine, A. R.	Wright, Wm.
Fosdick, F. C.	Manchester, A. E.	Zealand, T. H.
Fry, C. H.		

Proceedings Western Railway Club

THE PRESIDENT: We will call the meeting to order. We are a little late this evening, but will try to be on time in the future, and we hope that the members will gather as promptly as possible at 8 o'clock.

The first business is the approval of the minutes of the last meeting, which have been printed and distributed, and unless there is some correction to be made, they will stand approved. If there are no objections, they are approved.

The next in order is the report of the Secretary.

New Members.

Name.	Occupation.	Address.	Proposed by
C. F. Ryder, G. F., A. T. & S. F. Ry.,	Prescott, Ariz.	E. De Silva	
H. G. Doran, Commercial Acetylene Co.,	Chicago, Ill.	M. Moskowitz	
C. J. Swan, R. H. F., C. M. & St. P. Ry.,	Ladd, Ill.	H. E. Davis	
W. B. Paulson, Buda Fdy. & Mach. Co.,	Chicago, Ill.	J. W. Taylor	
N. F. Harriman, Chemist & Engr. Tests,	Union Pacific Ry., Omaha, Neb.	J. W. Taylor	
J. H. Bauer, R. H. F., N. & W. Ry.,	Williamson, W. Va.	D. G. Cunningham	
R. G. Kelley, Spec. App., L. S. & M. S. Ry.,	Collinwood, Ohio.	R. B. Kendig	
F. K. Vial, Griffin Wheel Co.,	La Grange, Ill.	J. W. Taylor	
F. W. Blume, Scully Steel & Iron Co.,	Chicago, Ill.	W. H. Dangel	
H. W. Watkins, M. C. R., Southern Pacific Co.,	Los Angeles, Cal.	E. A. Gilbert	
W. H. Holcomb, P. A. Office, C. M. & St. P. Ry.,	Chicago, Ill.	J. W. Taylor	
W. J. Hosceit, Natl. Dump Car Co.,	Chicago, Ill.	J. M. Snead	
B. R. Harscha, Rodger Ballast Car Co.,	Chicago, Ill.	J. M. Snead	
John Eiler, Blue Island Car & Equipment Co.,	Chicago, Ill.	C. H. True	
J. C. Connors, Ralston Steel Car Co.,	Chicago, Ill.	Warren Edwards	
Ottis Parsons, Atlantic Equipment Co.,	Chicago, Ill.	J. H. Wynne	
A. C. Woods, Union Spring & Mfg. Co.,	Chicago, Ill.	B. H. Jeffries	
R. E. Garber, Standard Steel Car Co.,	Hammond, Ind.	Aug. Schneider	
Edw. Steinke, Pur. Dept., C. B. & Q. R. R.,	Chicago, Ill.	Percival Hunter	
N. F. Rehm, Editor, Ry. Master Mechanic,	Chicago, Ill.	B. V. Crandall	
J. H. Hurlbut, Draftsman, C. R. I. & P. Ry.,	Chicago, Ill.	G. S. Goodwin	
W. L. Conolly, Supt. Tel., C. I. & S. R. R.,	Gibson, Ind.	T. H. Goodnow	
E. M. Wilcox, G. F., C. I. & S. R. R.,	Gibson, Ind.	T. H. Goodnow	
Charles Wolfe, G. F., Morris & Co.,	Chicago, Ill.	E. E. Jett	
S. O. Dunn, Westn. Editorial Mgr. Railroad	Agt. Gazette, Chicago, Ill.	C. H. Fry, Jr.	

Resigned.

H. R. Linn, Postel & Linn, Chicago, Ill.
M. Moskowitz, Commercial Acetylene Co., Chicago, Ill.
E. N. Armstrong, Pres't, T. P. & W. Ry., Peoria, Ill.
H. E. McCormick, Penna. Steel Co., Chicago, Ill.
H. J. Helps, Chgo., Bur. & Quincy R. R., Plattsmouth, Neb.
B. S. Atkinson, G. F. & P. A., L. & A. R. R., Texarkana, Ark.
C. H. Ferry, Chicago, Ill.
H. E. Poronto, P. A., Chgo. Junction Ry., Chicago, Ill.
W. C. Downing, Supt., T. H. & I. R. R., Terre Haute, Ind.
T. L. Condon, Pittsburgh Testing Laboratory, Chicago, Ill.
H. H. Clark, Link Belt Machy. Co., Chicago, Ill.
F. C. Avery, International Harvester Co., Sterling, Ill.
G. J. DeVilbiss, S. M. P., Hocking Valley R. R., Columbus, Ohio.
Chas. Hyland, F. B. M., M. C. R. R., Michigan City, Ind.
C. Thompson, B. & B. Dept., C. L. S. & E. Ry., So. Chicago, Ill.

Dead.

C. King, G. F. C. D., C. M. & St. P. Ry., Minneapolis, Minn. Died May 22, 1908.	
C. H. Dale, Peerless Rubber Mfg. Co., New York. Died July 18, 1908.	
O. J. Bamford, Standard Steel Wks., Chicago. Died June 19, 1908.	
A. Cauvius, Engineer, C. M. & St. P. Ry., Chicago. Died June, 1908.	
Jas. Mylett, Machinist, C. B. & Q. R. R., Burlington, Ia. Died Aug. 20, 1908.	
Membership, May, 1908.....	1,503
New members approved by Board of Directors.....	25
	1,528
Resigned	15
Dead	5
	20
Total membership	1,508

THE SECRETARY: Mr. President, I might say that during the summer we became the recipient of a very valuable library, being the railroad library of Mr. E. St. John, who at one time was General Passenger Agent of the Rock Island Road, and since then President of the Atlantic Coast Line R. R. After his death, Mrs. St. John sent the library to the Western Railway Club, something like 170 volumes of very good railroad literature, which have been placed on the shelves of the Club. I believe that is the only communication I have.

THE PRESIDENT: Gentlemen, you have heard the report of the Secretary, which shows the Club in a very prosperous condition. Before introducing the speaker of the evening, I would like to say that it would be a fine aim and accomplishment if we can increase our membership this year as much as we did last year. We started out last year to make an increase of, I think, about two hundred names, and accomplished about what we started for. We finished last year with 1,503 names; let us try to make it 1,700 by the end of this year. If everybody will make an effort, it will not be at all difficult to do, and I trust that the members will do all they can toward that end.

We should be very glad to have any of the members offer suggestions for subjects for discussion. One of the most difficult duties of the directors and of the Secretary is to provide satisfactory subjects for discussion. I believe that the Club can say with some pride that their past proceedings contain a great many very valuable papers that have been presented, and we trust that the work this year will be fully up to the standard.

I want to congratulate the Club on being able to make the very excellent start of the season which we feel will be made by the gentleman who is to talk to you this evening, Mr. Arthur Hale, Superintendent of Transportation of the B. & O. R. R., and Chairman of the Committee on Car Efficiency of the American Railway Asso-

ciation, who will speak to you on Car Efficiency. Gentlemen, I introduce Mr. Hale.

MR. ARTHUR HALE (B. & O. R. R.) : Mr. President and Gentlemen—Not quite a year ago I had the pleasure of addressing the New York Traffic Club on the work of the committee on Car Efficiency, and I purpose tonight to say some of the things I said to the New York Traffic Club and to bring my account up to date.

We make reports to the American Railway Association every year, we issue a lot of statistics, but I like very much to meet a lot of railroad men and talk over what we are doing, if possible discuss it and to give perhaps a more intimate idea of what we are at and how we are trying to accomplish what we are at than can be given in a formal report.

In the first place, the committee on Car Efficiency was appointed as the result of a recommendation made to the American Railway Association by Mr. Stuyvesant Fish. Mr. Fish, as you know, was President of the Association for a couple of years and on retiring about two years ago he wrote a letter to the Association recommending that they consider very carefully the subject of the common use of freight cars, the use of freight cars which could be used commonly, and he recommended what he termed a legal tender car, which should be good in any part of the United States. The recommendation came to the American Railway Association in the middle of what was called the "car famine," two years ago, which you all remember; at a time when we were very much excited as to how we were going to do our work, and the public and the newspapers were very much excited about the way they thought we were not doing our work. The American Railway Association, taking this recommendation of Mr. Fish that the question of the common use of cars, or pooling of cars, be considered, appointed a committee to consider this question and instructed that committee not only to investigate the advisability of the pooling of cars, but also to investigate everything connected with car efficiency and to report on anything that they thought could be accomplished in regard to car efficiency. It was understood that the committee was not to wait for the next meeting of the Association to report, but to report whenever there was anything to report, and report not only to the Association as a whole, but to members of the Association. It was a different sort of committee from any that had been appointed by the American Railway Association heretofore.

Now, in regard to this pooling of cars, I think I will get over that first, because that is the subject on which we have accomplished the least, I am afraid. There are a great many people who agree that, theoretically, the pooling of equipment is a good thing in times of car shortage. There are a great many other people who practically go in for pooling cars without admitting it, and, gentlemen, whenever the car of an eastern road is used for a west-bound

shipment—and that has happened more than once within my observation—the agent who sends the eastern car to the west is pooling cars. Whenever that happens, and it has happened with some frequency, it is an acknowledgment on the part of the agent that pooling cars is the proper thing, and whenever the Superintendent does not call the agent down, the Superintendent agrees that the pooling of cars is the proper thing. But that is not the sort of pooling that Mr. Fish meant. That is the sort of pooling that results in one road supplying the cars and another road using the cars.

Mr. Fish meant to propose the kind of pooling that would be fair and just to everybody and when we come to work out a pooling plan, a plan for the use of cars in common that is going to be fair and just to everybody, people will admit it in a theoretical way, some people will, but when we try to get it started, it is a very difficult thing, as I have found, and I think the reason for it is this: There are two sorts of railroads, when it comes to cars in periods of car shortage. There are the debtor roads and the creditor roads. There are the originating roads which have to buy cars or else they cannot ship anything; these originating roads generally buy more cars than they need, and they become the creditor roads. There is another kind of road that generally does not buy as many cars as it needs, and they become the debtor roads. Of course there are some roads right now who always have enough cars and they do not care, but there are not very many of them. In general, you can divide roads into creditor roads and debtor roads.

When it comes to this question of car shortage, when a man wants his cars back, it is very natural for him to want his own cars back, and the creditor roads in general want their own cars back; they see that if their own cars come back they will be all right; they do not care so very much about having the place of their own cars supplied with other cars; they do not take much stock in the pooling scheme, but they want their own cars back. These are the creditor roads.

Now when we come to the debtor roads, they do not want a pooling scheme; they generally want to go ahead using other people's cars. and so you see when it comes down to getting advocates for your pooling scheme, there is not really any one that wants it. It will only be when the creditor roads find out that about the only thing they can get is some pool understanding that will insure them an equal number of cars to those that are owned by them; when the creditor roads find out that is the best they can do, then we will get support for the pooling of cars and all our committee has been able to do so far has been to show by its statistics and to show by its reports that in times of shortage of cars, cars are pooled. Now, that we cannot get away from, and the creditor roads had better accept some pooling scheme that will assure them the number of cars that they own, or else the equivalent in money. That is all we

have been able to do so far. As I say, there are a good many people to whom that seems theoretically correct, but so far, in our nearly two years of work, we have not gone farther than that. So I dismiss the pooling scheme as something that is in the future.

When the committee was appointed, we were confronted with what was called a car shortage, and I am not going to discuss at length whether it was a car shortage or not. It is usually called a car shortage, and cars were short, but I have heard gentlemen, and well informed gentlemen, say that it was not a car shortage, that it was a motive power shortage. I have heard other people say that it was a shortage in general facilities, not so much in cars. I have heard people say that on their roads it was not a shortage of locomotives, it was not a shortage of general facilities, it was simply a shortage in repair shops. Other gentlemen have told me it was a shortage in men; that they could not get enough men to repair their equipment and keep it going, and I have known a few people who say it was a shortage in brains. Now, I do not know which of those shortages it really was, but it ended up as a car shortage. The shipper knew he did not have the cars he wanted. We were confronted with a car shortage and the newspapers told us it was the worst car shortage in history. Well, the newspapers, of course, know everything, so that it is very hard to say it was not the greatest car shortage in history, but it has never been proved to me that that shortage of 1906 was the greatest car shortage in the country. I have seen a great many car shortages. I remember the car shortage that immediately followed the anthracite coal strike and cars were terribly short in the East at that time. I think we had a worse time in the East in 1903 than some of you gentlemen had in the West in 1906, but I cannot prove that, because, until the first of January, 1907, there were never any figures made to show what the car shortage was, and the first duty that presented itself to the committee on Car Efficiency was to find out what the car shortage was.

So we started in and asked the largest railroads, we only asked about fifty to begin with, to tell us from the first of January, or pretty near the first of January, it was the 2nd of January, 1907, we picked out a Wednesday, to advise us what their shortage was, and also what their surpluses were. They laughed a great deal at us for asking for surpluses and also if they had any congestion. We had three kinds of blanks printed, one to show shortages, one surpluses and one congestion, and when we got those figures in we found that the shortage for the whole country was over 100,000. The fifty roads did not show quite so many, but I have equated that figure to the number of roads that are now reporting, so that these figures will bring up the whole shortage to about 110,000. But, on the other hand, there were surplus cars, the kind of cars that were in the wrong place, about 30,000. That was the information we started in on. We knew what roads the shortages were on for the first time. I have

also shown the shop cars on this diagram; there were less than 100,000 shop cars, which were normal at that time.

Now, gentlemen, undoubtedly these diagrams are familiar to a great many of you. We have been printing them for the last month on the back of every bulletin, but the shop car figures have not been shown in this way before. I had them put on these sheets for their first public appearance, and the reason these diagrams look a little different from the ones we have printed is because they have the shop cars added, in this dark space.

Well, to continue the story of the car committee and these shortages and surplusages. We got another report early in February, the 6th of February, and then the shortage ran up to 150,000, the surplusages, if you notice, came down to about 10,000 cars, spread over the country where they could not be used, and we were so discouraged about that that we thought, well, it does not make any difference about getting shortage figures any more, the shortage is altogether too big, and we did not ask for any more figures until April. We started in to try to rectify things as we could and by various methods that I will tell you about afterwards, but it was not until April that we got the next figures, and in May we got them again. Then the Association said they wanted the figures regularly, and since then we got them from all the large roads every two weeks, so that you have here for the year 1907 a history of the shortages—they are on one side and the surplusages are on the other side up to this black line for the year 1907. For the year 1908 we have figures showing the surplusages for the year; on this there are not any shortages at all.

Those diagrams of course give only the totals; we have the details and have published the details. We have in our files available for everybody the shortages and surplusages by roads. We did print the shortages and surplusages by roads until the surplusages got so tremendous that we did not dare to print them by roads, and we stopped. We were afraid they would be used for bear points for the various railroad stocks, so we stopped printing surplusages by railroads. I believe they were used as bear factors on the market generally, but not to very great effect.

There is a great contrast between what I am trying to give you now and the account I tried to give the New York Traffic Club not a year ago. I can remember so well telling those gentlemen—it was about this time a year ago—telling them, “It may surprise you gentlemen to hear it, but, excepting in some states for coal cars, there are practically no shortages in this country, and, gentlemen, we are approaching the time, in my opinion, when there will be a large surplus,” and that news was received with some incredulity. But you see on the diagram now after the panic struck us there was really no shortage last October, you see how the surplus started to roll in; you will find that between Christmas and the 8th of Janu-

ary there was an increase of 100,000 cars in the surplus. That is what the flurry did.

The next thing to observe here is the influence of hard times on the shop cars. You all know that in detail, but it is interesting to note it in bulk for all the railroads. You can see that for 1907 shop cars ran pretty even at about 100,000, that is about 5 per cent; they gradually increased in August when there was a surplus, so that there were about 120,000 in August, then they came down again. But this year this line of shop cars has run way over 200,000, and while it is getting smaller now, it is still over the ten per cent notch. In fact, the shop cars increased so rapidly in the early part of this year when we began to get rather more detailed reports that I resisted the suggestion on the part of some of our people that we report the shop car figures. I really thought—remember how bad things were in April and May—I did not dare to print the figures that there were over 600,000 idle cars in the country, adding the shop cars to the regular surplus, and I am rather glad I did not. You gentlemen probably knew it, or could have guessed it and now it does not make very much difference. There are still the 200,000, but we are down to a 200,000 surplus.

It was the hardest kind of work to find out what the shortage was. It was a pretty hard thing to get the railroads to tell us. It was a new thing; everybody is suspicious of new things and it took a great deal of time and trouble and labor with our friends to get them to give up the information, but now it seems to be coming in pretty rapidly.

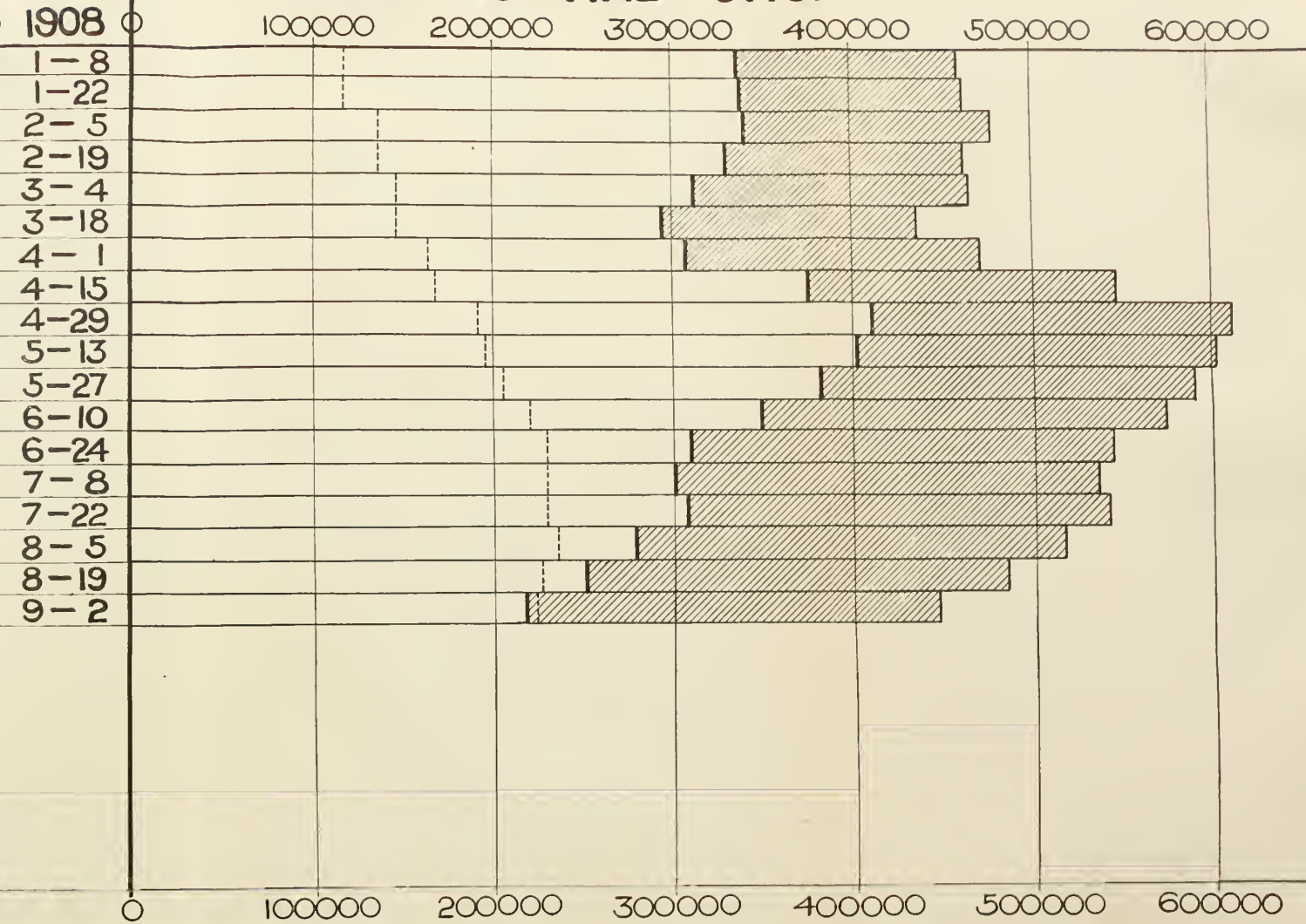
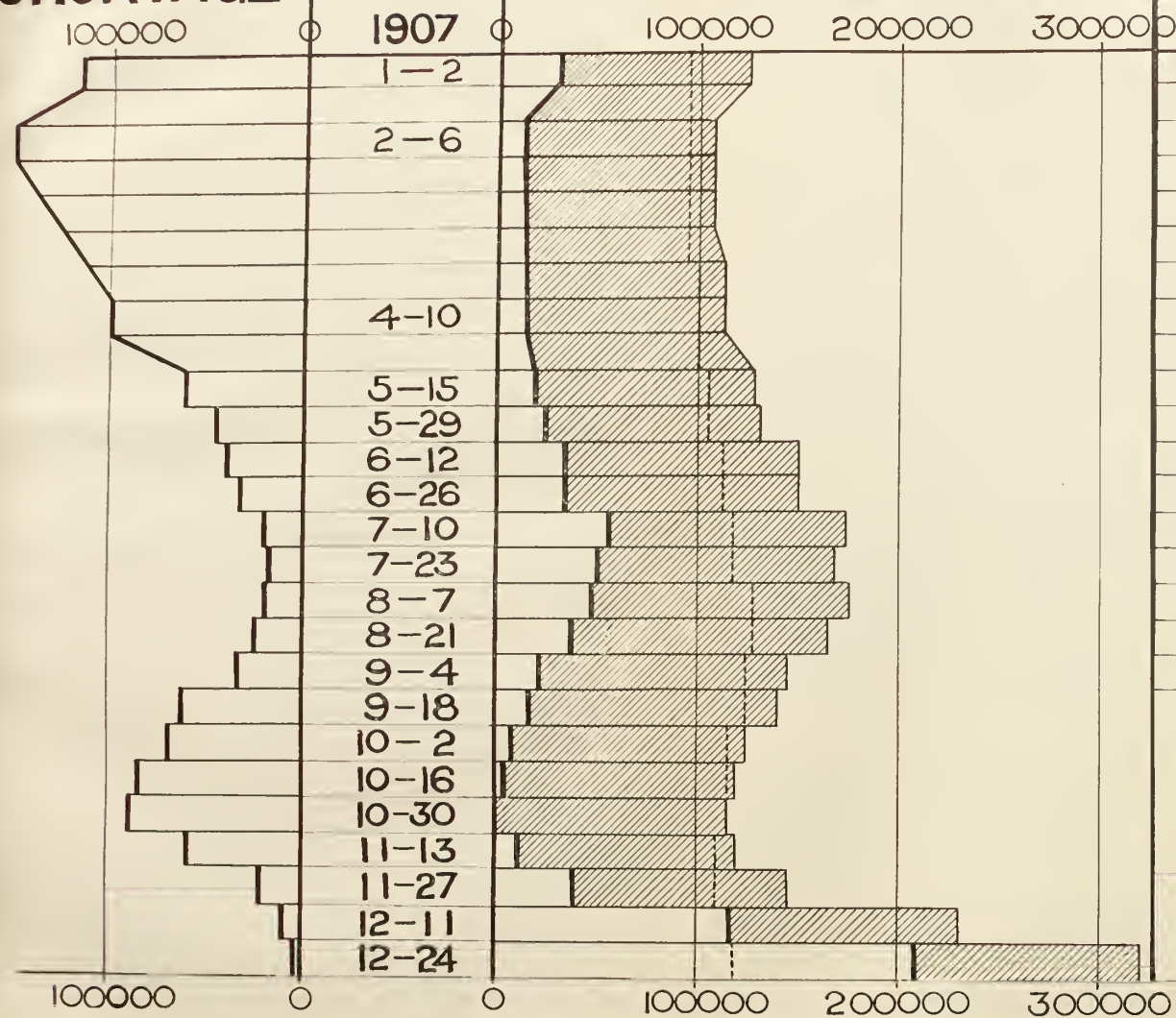
A harder thing to get was the surplus for this period when everybody was afraid of a shortage coming on again. Now, it is easy enough to get the surplus, because everybody feels there is always going to be a surplus, and everybody is telling us, but in the time when everybody was anticipating a shortage, they would not tell us very much about their surplus. For instance, there is practically no surplus shown the 10th of October, although I think there really must have been a surplus, but there is something about confessing a surplus of cars at a time when you think you are going to need the cars within a week or month, there is something about it that makes it very difficult for a railroad man to give up that information, and it is natural, too. I have walked down the street with a surplus of ten dollars in my pocket and I have had an acquaintance ask me if I was "flush," and I have not acknowledged that surplus of \$10. (Laughter.) I see you gentlemen have evidently been in the same predicament, but at the same time it is a great pity that it is so difficult to find out about surplus cars at a time when they are going to be needed, and I am very much afraid that when the good times come, when this line of surplus comes down to nothing and there are shortages on this side, that some railroads will be concealing a little surplus that they are holding for a rainy day.



SHORTAGE

SURPLUS AND SHOP

SURPLUS AND SHOP



I have known agents to forget to report a few nice box cars that they thought they would probably load on tomorrow, they have forgotten to report to the Superintendents. I have known Superintendents to forget to report fifty odd cars they had on a convenient siding. It is natural, but that holding back of facts in regard to surpluses is something that holds us all back and it is something that makes very difficult the work which we undertook when the shortages and surplusages became pretty near normal, to try to fill these shortages with those surplusages. If everybody had reported all these surplus cars in some months, I think there would have been no shortages. I think we could have told them what road to go to to get the extra cars, and while this is not a sermon or an exhortation, I do hope if any of you gentlemen six months from now, or a year from now get up against the question of whether you are going to report a surplus or not, you will report it, and I hope when you do report it, if another road wants it, you will let him have the cars, and then I certainly hope when you get in a hole, there will be somebody to help you out. That is, every time the Committee on Car Efficiency can indicate to one road where a shortage can be filled from the surplus, then the Committee on Car Efficiency justifies itself over and over again, and whenever I see a shortage on one side and surplus on the other, I feel the Committee on Car Efficiency has failed of its mission. We have not any power, we do not want any power. All we are here for is to suggest and to indicate, but wherever we do show that some railroads have a surplus and the others have a shortage, there is something wrong and the roads are not helping each other out as they ought to.

As I was saying to another Association not so long ago, this question of reporting surplus is after all an every day affair. You all understood that question of the surplus of the ten dollars, but when we get down to other things, it is a very every day affair. There are lots of poor people who five hundred years ago, under the civilization that they had then, would probably have starved in Chicago during hard times such as we have been having, but everybody in Chicago who has a surplus of food reports it in some way or other, and I venture to say nobody starved in Chicago in the last twelve months in all these hard times, simply because the people who are ahead on food reported in some way, to the proper charity organizations or the city government and the people got food from the surplus food reported by those who had a surplus, so people do not starve, physically.

Now, cannot we get the railroads so civilized that they will report their surplus in cars and the other railroads will not starve? That is about what I am after; that is, to fill the shortage from the surplus. We are a little proud of starting these reports going and we think, whether the Committee on Car Efficiency survives or not there will be somebody in the central body of the American Railway Asso-

ciation who will keep these figures going forever, so that whenever there is a car shortage, the newspapers can not say it is the greatest car shortage there has ever been.

I was speaking about our failures in filling shortages with surpluses. There is another failure we made, and a thorough failure. We asked everybody every two weeks—as these reports are made every two weeks—we asked all the railroads to report congestions to us, and we got very little in reply. Railroads do not like to report congestions; they are ashamed to have congestions; they are afraid if it is known that they have congestions, people will route their freight away from them and ship by another road, but a great deal of harm comes from that sometimes. You remember how in this period here when the roads were short over 100,000 cars a day, you remember how through some kind of a misunderstanding there were thousands and thousands of cars of coke loaded for Arizona standing on the side tracks of the Southern Pacific, Texas Pacific, Rock Island and all the roads between the Alleghenies and Colorado. The Committee on Car Efficiency was criticised for that; they said, "We ought to have known about this congestion, we ought to have taken means to prevent it," and so on. Why, gentlemen, the roads did not tell us. The road that was foremost in criticising us had not reported a single car of coke for months and months when all of a sudden they found they had a congestion, and let us know it, but that was after they had criticized us for not telling them there was a general congestion. I really think in that particular case, although we were new at the game,—I do not think we were nearly as well known as we are now, we had not had the advertisement that these figures have given us in the newspapers, but I really think if we had known of the thousands of cars of coke that were strung up on the roads leading to Arizona, we could have done a great deal. I think we could have preserved two or three thousand cars for general use for the country for filling those shortages if we had known exactly where these congestions were, and with that particular case in view, and a lot of smaller ones, we are going to continue; we are not licked; we are going to continue and try to get information as to congestions and we hope the roads will tell us about congestions and we will use the information as tactfully and carefully as we can with the idea of improving the car efficiency.

Gentlemen, besides these figures in regard to car shortages and surpluses, we obtained a great many other figures from railroads, figures tending to show the car efficiency of the railroads in particular and the country as a whole. I suppose you have seen those large bulletins that come out monthly now. They have brought together in one place all the information that we could figure out was useful in the way of showing what cars were doing. We have, of course, the old figures of miles per car per day; we have the percentage of mileage loaded and empty; we have the average load of the car.

We have a new figure which we got by ourselves, the ton miles per car per day, which I think myself is the best indication of car efficiency, and high authority has called the best gauge of efficiency. We have the average earnings per day per car owned and per car on the line and we have also figures for each road showing how many cars it has and how many cars it used. That is, we show up every month the creditor and the debtor road, and the railroads have been very loyal in giving us these figures, even when they apparently showed against them. The only thing they have objected to is giving us the figures in regard to earnings per car per day. Some roads seem to think they are earning too much per car per day and they will not give us their freight record monthly and we do not print it. Anybody that wants to can go to the Interstate Commerce Commission's figures and fill up our gaps there, but of course if our subscriber says, "Do not print these figures," we do not go to the Interstate Commerce Commission to get them.

I am rather sorry the report has those gaps in it, because I think if a railroad earns a large amount of money per car per day, it is a credit to that road; I do not think it ought to be ashamed of it. However, that we leave to our subscribers as to those figures. I hope that as those figures are compiled for more and more years, they will become of much greater use, and if we think out other ways of indicating the efficiency of cars on railroads, we will add columns to those reports.

We welcome suggestions to make those figures better and, gentlemen, we pay a great deal of attention to making the figures correct. We go over them very carefully before they are figured, we correspond with people when they look funny, as they do sometimes. We have them all added up with adding machines and I think we have made very few mistakes. That, gentlemen, is the statistical side of our work; the efforts that we made to find out where we are, the efforts that we have made to give a foundation on which the railroads can work in order to improve their car efficiency.

I need not say that car efficiency is a very different thing in times of car shortage and in times of car surplus. Nowadays about the only thing that can actually be done to improve car efficiency is to hurry the movement of loaded cars. We have known so many more periods of car shortage than of car surplus that we cannot neglect in these times of surplus the precautions which have been of use to use in times of car shortage; especially, we cannot neglect the precautions which we have taken to prevent our patrons from unduly using cars and that brings us up against demurrage.

The introduction of demurrage in car service as it was first called was about the first step that was taken to improve car efficiency and that was twenty years ago or more. I know I was quite young in the transportation service when that thing started and we found in the Car Efficiency Committee that that work was not finished,—that

there were a great many places where the demurrage system could be improved, and there are a great many places still where the demurrage system can be improved now. Following that out we began by finding out where we stood.

The committee has corresponded with all the car service associations or car demurrage bureaus in the country. We got all their views, we got all the rules promulgated by state commissions and we helped the Car Service Committee in proposing the new rules to the American Railway Association which were passed about a year ago. We have taken up the question of the adopting of those rules with every one, the commissions and associations through the country. We have got those rules very largely adopted in the country and where there are articles excepted that were not under demurrage, as happens in a great many cases, especially where rail and water meet, where there are trans-shipments of articles, we have kept the subject stirred up and there is a great deal more demurrage collected at places of that kind now than there was two years ago. We do not take all the credit for it, we take very little credit for it, but we have at least kept the question alive and have tried to make every one who is giving away car time free, realize that he is doing it.

It has been very difficult in the last year, with all these surpluses confronting us, it has been very difficult to keep the demurrage system going, but the new law, the Hepburn Act, did very much to help with that, and the various commissions have in general helped us very much in keeping that thing going.

There have been a number of matters where our relations to the public have come up beside those cases where the public has delayed cars, as when the public insisted on using cars with small loads, and wherever we have been able to suggest, we have suggested in some cases, and especially to the traffic people, and the traffic people have succeeded in increasing the minimum loading in a number of cases.

There has been quite a considerable progress all along the line in the last two years in increasing the efficiency of cars in methods of that kind, where we had to get the public to help us. Besides that, we have tried to keep on good terms with the Government, I should say the various governments. It has been a little hard in some cases, especially where the State legislatures were trying to do their very worst with us, but some of the commissions are a very good sort: the Interstate Commerce Commission especially has helped very much indeed in the formation of demurrage rules and in holding back that reciprocal demurrage, which is extremely unjust. In return, where the Interstate Commerce Commission has made rulings on demurrage and various other car service matters, that have conflicted with our rules, we have tried wherever we could to change our rules to conform to their ruling. We have tried to work with them and that has been reciprocated, I think. I know that since this work started I personally am not really as afraid of the Interstate Commerce Com-

mission and State Commissioners as I was before, and I think the other members of the committee feel exactly the same way, and a lot of other people whom we have brought into communication in that way with the various commissions.

The last work that we have been on and one that will interest you mechanical men, is one that has come up only in the last year and involves interchange reports and, in a way, inspection. In order to form any large scheme for distributing cars, we have got to know where they are. That, of course, is axiomatic, that is a truism, but, in a great many cases we do not know where the cars are. I have not said anything of a record which the committee kept for some of the railroads here during this period of car shortage to try to see just where the cars were. The railroads disagreed among themselves as to how the car balance stood, and we undertook to find out directly from the interchange reports just where they were. We had some little success in that, but we would have had a great deal more if the interchange reports had been invariably correct; but, the interchange reports are one and two per cent wrong, and they ought not to be as wrong as that.

There is a great chance for improvement of interchange reports and that is one of the things the committee is still working on. We sometimes get reports in from places and check them up against each other to find errors in that way, but latterly we have done more work in the way of going from place to place and seeing if the railroads, by getting together, cannot improve their methods in making up interchange reports. There are a great many places still where the delivering railroad takes one account of cars and the receiving railroad takes another account of cars, and the inspector of the delivering railroad takes one account and the inspector of the receiving road takes another account. Well, if you are going to check every car three or four times you are apt to put pretty poor help on and it seems to be the experience of those who have tried it, that if you put one first-class man to do a job, even a clerical job, he will do it a great deal more accurately than if you have four second class men, or even two second class men on it. That is something that may come up to you, gentlemen. It is worked out in detail in Denver, where the interchange reports are all made by one bureau; it is being considered in various other States, and if plans of that kind come up, especially if they involve the making of interchanges under the inspectors, I trust you gentlemen will consider that carefully and see if there is not a chance to increase the efficiency and economy at the same time.

There is one place that I have in mind, gentlemen, where there are 500 cars interchanged in a day on an average, and the time of twenty-three men is occupied by the various railroads at this point—it is not a very large point—the time of the twenty-three men is occupied in recording and inspecting the movement of those 500 cars. Well,

you gentlemen who have had interchanges here in Chicago know about how many men you ought to put on the recording and inspecting of 500 cars, and I am sure you will agree with me that it ought to be less than twenty-three. That is a place where they have been meeting and have not been able to reduce that number, but I think they will, and I think there are a great many places in this country where, if that question of interchange is taken up and the mechanical and transportation people work together, where results will be gained in getting absolutely accurate information at considerable economy and at the same time improve the movement of cars, so then in two ways you will improve car efficiency. I thank you, gentlemen.

THE PRESIDENT: Gentlemen, I am sure you have all been very much instructed and interested in the account that Mr. Hale has given of the operation of the Car Efficiency Committee, and I have no doubt that if there are any points that you would like further explanation on, Mr. Hale will be very pleased to answer any questions and it may also be possible that some of those here present may have some suggestions to offer which Mr. Hale will be very glad to hear. Many of you were right up against a car shortage before and are probably now right up against a surplusage, and particularly the surplusage of shop cars, and I think possibly some of the points brought up on these lines might be of interest and serve as a discussion of the question. We will be glad to hear from any one now on anything that you wish to offer in that line. Mr. Hennessey, can you offer us some suggestions on these lines or some points in connection with the subject?

MR. J. J. HENNESSEY (C. M. & St. P. Ry.): I feel that I am hardly competent to discuss that subject tonight, Mr. President.

THE PRESIDENT: Possibly we may have with us some transportation officers who have had a line of experience that will be worth hearing. I understand Mr. Warner, General Manager of the Belt Line, is here. If he will be willing to address us, we will be glad to hear from him.

MR. J. M. WARNER (G. M. C. & W. I. R. R.): Mr. Chairman and Gentlemen: I had not expected to be called upon to make any remarks this evening, therefore, am thoroughly unprepared to do so.

The thought occurred to me during this very interesting talk of Mr. Hale's that there was a missing link, namely, delays to cars in large terminals have been overlooked. In the Chicago district, and presumably the same holds good in other large terminals, there is a great deal of delay to cars that I believe could and should be avoided. In my judgment our present system of handling cars offers an opportunity for radical improvement. I feel that no one is better equipped to point out a way by which this improvement may be brought about than the speaker of the evening. While at first thought, it may seem a small link in the chain of car efficiency, investigation, I believe, will prove it is worthy of serious consideration.

For instance: In the Chicago district, with which you are all familiar, we are practically operating under the same system with respect to the interchange of cars between roads that we were twenty years ago. I refer more particularly to the inspection of cars in passing them from one railroad to another. Under the M. C. B. rules, as I understand them, when a car is offered by one road to another a defect card should be furnished covering all defects for which the delivering road is responsible at the time the delivery is effected. However, in order to expedite the movement of cars in this district, it was found necessary to adopt special rules based upon the M. C. B. rules, which would permit the interchange of cars between roads on what is known as a record inspection; that is to say, a record of the defects on a car should be taken at the time the delivery is made and a defect card furnished at a later date if requested. The special rules referred to are open to criticism on account of their failing to accomplish all that was expected in the prompt handling of cars and are causing troublesome complications in adjusting claims for defect cards.

The Chairman has asked the members to suggest subjects to be brought before the Association for discussion and in compliance with that request would respectfully suggest that the question of our present system of car inspection and the adjustment of defect cards between railroads be considered.

THE PRESIDENT: There are quite a number of gentlemen here present who have had considerable experience in interchange at Chicago terminals, possibly some of them can offer suggestions that would assist toward car efficiency. Mr. Goodnow, I believe, is connected with one of the large roads running into Chicago; can he offer something in that line?

MR. T. H. GOODNOW (L. S. & M. S. Ry.): Mr. Chairman and Gentlemen, I do not believe that I can offer anything now in the way of suggestions for improvement, but in connection with the remarks of Mr. Warner, I would like to make an answer in part. I do not feel that the system of inspection and interchange is handled as it was twenty years ago.

I believe that twenty years ago the customary practice was to hold the car up in interchange if it had cardable defects and to secure the card. The present rules of interchange practically were the outcome of what is known as the "Chicago Agreement," originating in Chicago to facilitate the movement of the cars. It was in 1896, I believe, these rules were adopted by the roads in Chicago and finally almost as a whole by the M. C. B. Association.

In regard to the question of defects, or defect cards and their issuance in Chicago, I do not think that the average request for a defect card dates over three months from the time the car is actually delivered. There are isolated cases where it will, from the fact that they run on notation record. For instance, the customary practice

is to accept east-bound cars by Eastern roads and run them on record, allowing them to go home, and then request a card for whatever has to be issued when the car is delivered to the Eastern connection. In this way it saves the issuance of a great many cards which would probably be issued on inspection in Chicago territory, but which, when the car goes home, either through being overlooked by an inspector, or the owners accepting as the owner's responsibility, the card is not requested. In fact, I do not believe there is any system of inspection, so far as it pertains to the defect cards, to facilitate the movement of cars in Chicago any better than the one today, which is the notation record, and which, I might add, depends on the honesty of the men handling it. Of course, it is to be expected that the men will be honest in taking these records and when the claim comes along three to four or five months afterwards, if there is anything that they have not got a record of, ask the delivering roads for cards only on what they hold record, but the car is not stopped, the car simply moves on and the record supports any claims that are made.

THE PRESIDENT: Mr. Clark, can you offer any suggestions in this line of efficiency?

MR. F. H. CLARK (C. B. & Q. Ry.): Mr. Chairman, I think we are fortunate in having Mr. Hale with us tonight and getting his views and information in regard to car shortage and surpluses.

I suppose that the question of car efficiency is one of the most important questions before the railroads and it is certainly worth careful consideration. I hope there are some transportation men here tonight and that they will be able to give us some information on this question.

I am a little bit curious about the figures reported and shown by Mr. Hale on the surplus. I wonder whether the surplus as shown really is a true surplus. I know that a year or two ago some of the railroads became very much interested in the movement of cars and made a determined effort to improve the car mileage per day, and the ton mileage per car per day. I wonder whether the car mileage per day at present is equal to the car mileage per day of a year ago and whether the ton mileage per day at present is equal to the ton mileage of a year ago. I think Mr. Hale has figures for a year ago of car mileage, but from what he has said tonight I doubt if he has figures of ton mileage; perhaps he can tell us whether the car mileage per day is as high at present as it was say a year ago and whether, if the car mileage was as great as it was a year ago, there would not be a considerably greater surplus of cars. I have a feeling that whenever it becomes necessary, on account of car shortage, the railroads can get considerably better mileage out of their cars than they are getting at present.

MR. HALE: In regard to these figures I can only say that these surpluses were reported to us and after checking and comparison,

they are given here. The thing that I am more doubtful about is the shop cars, but that is probably because I am an old transportation man and I have never known too big a surplus to be reported, and I have frequently known of shop cars not being reported, on the roads with which I have been connected.

Now, up to this time, if you will notice on these lines which show the shop cars, that each month is solid. These are reports made to us, about two months late, of the average number of shop cars. Beginning in 1908 in April we got special reports of shop cars every two weeks. You can compare them with the monthly figures here which are supposed to be the average, and they are behaving about the way they should, that is, they have begun to go down now when there is more call for cars.

I will confess that a couple of weeks ago when one of the Chicago lines wanted a lot of 300 grain box cars, we had a little difficulty to tell them where to go, but that was because people were wanting to hold them in their service themselves. They finally got the 300 cars all right, but although a great many of these surpluses are surpluses which people do not want to give away, I think they are genuine. However, the pudding will be proved in the eating; when we get to having shortages again we will see whether those are genuine surpluses or not, but I can assure you that these surpluses here a year ago were genuine surpluses, though there would be a surplus of one kind of car and a shortage of another kind of car.

Now about the average car mile per day, that is a very interesting question. The last month we have published in full is April, 1908. We are several months behind on our tonnage and mileage figures, but I will read from our introduction to Statistical Bulletin No. 36, covering April, 1908, some figures which throw light on the question you raised: "Compared with March, 1908, the April performance was unsatisfactory, the car mileage, tonnage and earnings falling off; the actual miles per car per day averaged 19.6, the lowest of which we have any record." That is April, 1908. In April, 1907, the average mileage was 24.8, a year ago, nearly twenty-five miles. This year only 19.6. That is for all the cars, including, you see, the surplus and shop cars. The elimination of the surplus available and the excess of bad order cars, however, give an average of twenty-five miles per day, for April, 1908, which compares favorably with the actual figures during the period in which cars were in demand. This pretty nearly confirms my thought that this is the right surplus, as the other cars which we were using make just about the same mileage as a year ago. Then we go on applying the same process to earnings per day and we secure an average of 2.38 per day for each car actually in use. Last year it was 2.56, so we were falling off on earnings per car per day, although the mileage is about the same.

MR. W. C. SQUIRE: That shows no decrease in the tonnage and loading of cars.

MR. HALE: Decrease in tonnage, slightly. Well, now the lading I can tell you that, too. This is simply my estimate you know; the ton miles per car drop from 39.33 and that is the question of earnings, and of course that "per car," that is obsolete, that has nothing to do with the surplus. That will work out.

MR. W. E. SYMONS (Pioneer Cast Steel Truck Co.): I think I voice the sentiments of all the previous speakers in saying that the Club is very fortunate in having Mr. Hale with us this evening to talk on the question of car efficiency. I also think we have probably been a little bit remiss in not getting him here sooner.

A few months ago this Club had a very able and interesting paper by Mr. Beecham in which he outlined some methods, or showed the results from certain methods of car interchange in the vicinity of Chicago. He mentioned particularly one case wherein cars had been shuttle-cocked back and forth for some two or three months from one road to another at an expense of \$75 or \$80 at a time when the roads were badly in need of cars and everybody was crying shortage. This with some other points presented by Mr. Beecham at that time would seem to indorse the views presented by Mr. Warner, that our methods are no better in some matters than they were some twenty years ago, and in these special cases evidently a great deal worse. Notwithstanding these exceptions Mr. Goodnow is correct in his general statement that the Master Car Builders' Association through the medium of their rules have effected great economies in the matter of interchange of cars, and in car design and construction much greater strides have been made.

There are one or two points in connection with Mr. Hale's talk that are very interesting and on which I wanted to drop a thought. First, in reference to the legal tender car. The idea of the legal tender car is an excellent one, particularly so after the interchange of cars had reached that point that they went all over the country; they belong to certain roads in the matter of ownership, but in practice are the cars of the railways of the United States, Canada and Mexico. Therefore, if the cars were all of a uniform size, particularly those used for the transportation of certain commodities, a legal tender car would be the ideal one for handling these commodities. Such a car would also facilitate keeping accounts, cost of maintenance, etc. But in reality we have no legal tender car and are not approaching one very fast. It is not uncommon in the interchange of cars, that a 40,000-lbs. capacity wooden car, weight about 28,000 lbs., twenty-five years old and worth a little over \$100, is interchanged for a steel under-framed car of 100,000-lbs. capacity that weighs 46,000 pounds and is worth about \$1,000; and until this condition can be changed by some rule, or agreement, between the roads, whereby the old, light, obsolete equipment shall be kept at home and

only such equipment offered in interchange as may legally and practically meet the requirements of a legal tender car, the interchange of cars will not be on a basis of equality as between the roads.

In the matter of shop cars referred to by one of the speakers and very ably answered by the speaker of the evening, I recall two cases that came under my observation in which the number of cars reported by the roads were very much in error. In one particular instance I recall the reports invariably showed from 3.5 to 5.4 per cent of cars in the shop, when, in reality the number was more often 12 to 15 per cent. If there is anywhere near this amount of variation in reporting surpluses and shortages, particularly surpluses, there is a wide field for the Car Efficiency Committee to work in order to get the roads to give them the correct information from which they compile their reports, and until that is done, the reports will not be as valuable as they will after that degree of accuracy has been attained. The only way to attain that result is to keep constantly hammering away, and from the improvements in the reports from time to time it is evident more interest has been taken by the roads, and a greater degree of co-operation between the railroad officers and the Car Efficiency Committee exists at present.

In the matters of per diem and demurrage, it would seem there is a broad field for the committee's efforts to accomplish much good. As I understand it, in the New England States there are certain statutory provisions whereby cars can be held something like four days prior to unloading; then there is a reasonable time for unloading, making altogether some five to eight days that the car is held, although the line handling may not have moved it more than 200 to 300 miles, the result being in many cases an average movement of about 10 miles per day and sometimes less, and until such legislative restrictions can be modified, this and similar evils will have to be borne with and the best possible solution made of the difficulty.

It certainly is very discouraging to railway officers in their efforts to get maximum mileage out of equipment, to be handicapped by legislative enactments or the sentiment of the people adverse to their interests.

This same feature of prompt car movement affects in no small degree the general situation of car shortage, surplus, etc., and apropos remarks of my friend Mr. Warner, we are doing many things, or allowing them to be done, on a basis no better than followed twenty years ago, and in some respects not as good, for at that period the terminal facilities of railways were more in proportion to the requirements of the roads than at the present time.

The railways have increased in volume of business and equipment over 100 per cent in the past twenty years, while the terminal facilities have been increased not more than about twenty per cent.

What the country needs today, and will have to have before we will get the maximum efficiency from freight cars, will be about 170.-

000 miles of additional railway in the form of second, third and fourth yard tracks and terminal facilities, and several million dollars spent for improved wharves, warehouses and storage places, so that the commodities shipped in railroad cars will be unloaded on arrival at destination instead of using the equipment as at present for portable warehouses.

If the commodities shipped in freight cars were unloaded as promptly on arrival as express and baggage cars are, (which is hardly in the range of possibilities), we would probably have one-half to three-quarters of a million cars more than needed in America, which means a great deal of money invested that brings inadequate returns.

If the legislatures and newspapers that have been so unfriendly to railroads would have devoted their time and energy in an effort to relieve the railroads by urging individuals and industrial concerns to provide facilities for promptly unloading the cars, the situation would have been much relieved, and we would not have been confronted with such conditions as we were two years ago when the Great Northern and Northern Pacific Systems combined had a total of about 20,000 loaded cars which they wanted to move worse than either the consignor or consignee wanted them moved, yet were powerless because of the elements, their lines being blocked with snow; yet the papers and politicians were demanding the revocation of their charters, and saying many harsh things about the officers of the road. And when Mr. Hill proceeded to raise money to buy additional engines and cars, (although they had plenty if they could have used them to good advantage), they enjoined him by some legal form or process from doing precisely what they were demanding of him to do.

This latter feature, of course, is more a question of policy than operation, but to my mind such information should be largely disseminated among gentlemen who have to do with the maintenance and interchange of cars, so that they will be aware of everything that may have any bearing on the situation, whereby they can relieve or improve it, to the end that a combined effort be brought about by every one concerned, with a view of getting the greatest possible mileage and service that can be secured from equipment. There is no one better able to guide us in these matters than such men as Mr. Hale, who makes a special study of it. We are fortunate in having him here with us this evening, but as I said before, I think we should have had him here some time ago.

MR. HALE: In following one point made by the last speaker, I would like to say something about the New England situation. As he says, there are state laws in Connecticut and Vermont in which the full time allowed for loading and unloading cars is placed at four days. As you know, in the rest of the country forty-eight hours is usual. Now, those state laws of course only cover intra-

state traffic, that is, traffic originating and stopping in the one state where that law applies; they do not apply to inter-state traffic, but the New England railroads—they are borrowers, you know,—in order to keep in with their own people, have extended that four-day rule to inter-state, as well as intra-state business. That is, of course, a pity, but recently there have been a number of cases in other states where it has been shown very plainly that state rules and state laws do not apply on interstate traffic in this demurrage business. It has been shown in New Jersey, where the State passed a 72-hour law and the railroads adopted it for intra-state business, that is, business starting and stopping in New Jersey, and there is not very much of that, but the railroads entirely neglected the rule for the inter-state business, and the state did not say a word. In Pennsylvania it came up in the courts and the state courts of Pennsylvania turned the commissioner's rule down. On a similar case it has come up in Ohio, where the Ohio State Commission has made a 72-hour law on all cars, and although the railroads at first yielded and put the state rule in on intra-state business, I am glad to say now the railroads have taken a firm stand and will apply the 72-hour law only in intra-state business, originating and stopping in the state of Ohio. The railroads are putting their own rules in effect in intra-state business in Ohio with the 48-hour limit, and they enjoined the State Commission from interfering and when the injunction question came up the attorney of the State of Ohio asked for a continuance, which showed, I think, that he did not think the State Commission had much show.

Now, with those three cases which have come up recently, I feel that the next time there is a car shortage, we can go to New England, I think we can have the Interstate Commerce Commission back of us—I know we will—and possibly a little bit more union among the other railroads and we can induce the New England roads to do the right thing and put in a 48-hour limit on inter-state business, which will protect our cars; but that is something in the future; we have got to wait for a car shortage in order to do that, but we have not gone backwards on this demurrage business, and I hope we are going forward.

THE PRESIDENT: Mr. Hale, it occurs to me that one of the most promising directions in which car efficiency can be increased is the reduction of the dead time during which the car is standing still, awaiting loading or unloading, and I would like to ask if the Car Efficiency Committee is gathering any statistics on this subject? It seems to me that the general public and the shippers in particular have been lacking in correct information. They have been gross transgressors of the rights of the owners of cars and yet they have not recognized the fact and are surprised when such a suggestion is made. Now, it seems to me that if the railroads, through their Car Efficiency Committee, could be in position to put the figures ap

to them and show how much of the time of a car they are monopolizing for which they are not paying and to what extent it is interfering with the movement of the car, that it might be a very great help toward increasing the mileage of the cars and the general efficiency.

MR. HALE: Mr. Chairman, it has been proposed a number of times that this usual time of 48 hours be reduced, and that has been discussed by various committees of the American Railway Association, I think on the floor of the American Railway Association, but we have not seriously proposed a reduction of time from 48 hours at present, and for these reasons,—there are so many exceptions in various parts of the country by which extra free time is given over the 48 hours that we felt that the first thing to do was to get as many of those exceptions reduced and to bring the general time down to 48 hours before we attempted to get anything lower than that. But there is another reason which I think is only fair for me to state to the Western Railway Club. It has been shown in a number of cases that the railways themselves have held freight cars, especially when loaded with coal, ballast and other things, the full 48 hours which they allow to consignees and in a great many cases longer. That question was brought up about a year and a half ago in Chicago by one of the mercantile organizations here. They said: “Why do you make us unload in 48 hours when you yourselves are taking very much more time with your coal?” and I procured figures giving the time that fuel coal was held by all the railroads coming into Chicago, and I am sorry to say that the average delay was more than 48 hours, and on some roads it was very much more. Now, that is something we have to clear our own skirts of first; we have to cut our own delays out first before we can squeeze under the 48 hours. The 48 hour limit has been decided reasonable, I think, in every case where it has come up in court. We have got that 48 hours and our present feeling is that we ought to hold onto that. We use it ourselves as railroads and we ought to cut the concessions down. You will be surprised to find how many concessions there are,—an extra day for sampling, an extra day for unloading, 48 hours perhaps for reconsignment, an extra day for so many miles that a man lives from the railroad station, they have that down in the South. There are some places in which there are from 96 to 128 hours for coal. Those are things that we get together and print and bring before the American Railway Association every six months, and I am glad to say that as that report comes up there every time some of those things are cut out. I think we are getting ahead on that, although there are lots of people who are trying to get those concessions increased.

Furthermore, gentlemen, while on the continent of Europe twenty-four hours is generally allowed, yet their cars are so much smaller than ours that if we do push for anything less than 48 hours, we

will be making history; we will be doing something which I hope will be done some day, I agree with you that it ought to be done, but it is something we will have to clean our own skirts of first before we can take an onward step, before we can do very much.

MR. A. E. MANCHESTER (C. M. & St. P. Ry.): About a year and a half ago, there was considerable controversy among leading railroad men as to what was the matter. Some decided that there was more double track and more railroad track needed to handle the business of the country, while others contended that it was lack of terminal facilities; the inability of passing the traffic through the large terminals that was causing the delay.

The thought occurs to me that if the car efficiency could be figured from the basis of the actual time consumed in transportation and the actual time consumed in the terminals, that it might bring more vividly before the country and before the management of the railroads where the actual shortage did exist, whether it was the shortage of track facilities, a shortage of motive power, or a shortage of terminal facilities.

In reviewing the shortage and surplus propositions and taking into account what would possibly be the results, whether one central power that could move the surplus cars toward the shortage districts, the thought occurs, what kind of cars would the shortage district get? As a general proposition, whenever a line becomes at all flush with cars, there is a certain lot of undesirables that is set aside, and it is those undesirables, I believe, that form a large part of the surplus cars, and until the ideal car comes that has been referred to, or the legal tender car, the same kind of a car for all lines, I do not believe the surplus will ever be of very great assistance to the line that may be short of cars.

MR. GOODNOW: I would like to say one word more following Mr. Symons' remarks, and referring to Mr. Beecham's paper, to which he called attention, which, if I remember correctly, was a case of a car in general bad order which was being sent home for repairs, and in which case he did not comply with the rules in securing home-route cards. It is possible that Mr. Hale, through the Car Efficiency Committee, would be able to help out the Mechanical Department in the question which they have taken up for a number of years, and that is the home routing of cars on account of bad order and in need of general repairs, as to the routing furnished in such instances. In asking for home-route cards, routing is often furnished which requires the movement of a car over a large number of roads, instead of delivering it to the nearest point of connection over which it should make its movement home. I recall where I asked for home-route cards at Toledo on a car belonging to a southern road, which was home at Cincinnati, and when such was furnished, the routing took the car over the L. S. & M. S., by delivering it to the N. Y. C. & H. R., who, in turn, delivered it to some other

road, and it was finally returned to the Michigan Central R. R., at Buffalo and delivered by them to the Wabash Ry., at Detroit, and by the Wabash Ry., to the C. H. & D. Ry., at Toledo, this evidently being the route over which car had moved since leaving the owners. The L. S. & M. S. Ry. had the car at Toledo and could have delivered it direct to the C. H. & D. Ry., but because that company did not receive the car from the L. S. & M. S. Ry., they would not take it from us. Now, I believe there are hundreds of this kind of movements furnished on cars every month when home-route cards are asked for. The point I want to make is, the irregular or long haul that is given bad-order cars in attempting to get them home for repairs, which I maintain should be so handled by the Car Accountant of the owning road as to enable delivering car to the nearest possible connection, so as to get car home and not haul it all over the country to accomplish this purpose.

MR. HALE: I am glad to say that that is something that is up and it is something where the American Railway Association has held off because it thought it was an M. C. B. Association matter, and I find the M. C. B. Association held off because they thought it was an American Railway Association matter. I am glad to say that the Associations have gotten together now and the M. C. B. Association has told us that they do not care by what route a car comes home, and I think that that is something that we will be able to get into shape in a comparatively short time. It is a new question, however, and in many cases where a short cut involves a haul over a railroad that has not moved the car loaded, there must be some method devised of compensating the road that makes the short cut and that is something that demands a great deal of consideration and some compromise before we get through with it, but I am glad to say, Mr. Chairman, that it is in hand, and I admit it might have been in hand before, perhaps it should have been considered before, but it is in hand now.

MR. J. F. DE VOY (C. M. & St. P. Ry.): Mr. Chairman, I have listened to one of the most instructive talks, perhaps, that I have ever heard, and I am sure no one appreciates it more than I do. I hate to ask questions, but several speakers have mentioned, and Mr. Hale has brought up the matter of a legal tender car. I can figure out in my own mind a solution of nearly everything with the exception of the legal tender car. A legal tender to my mind is anything which belongs to an individual, or a corporation, for just the amount of revenue it will bring to him. I cannot figure out anything other than that it would be confiscatory to make a legal tender car, and I rise for information. There must be some well thought out plan to put such into effect.

For instance, I own 2,000 cars of 100,000 pounds capacity, and am able to earn, say ten cents a mile. My neighbor wants one half of those cars, because he can make eight cents a mile. How will you

formulate a rule whereby the regulation of a legal tender car can be handled? I say again, to my mind there is but one thing, and the making of the legal tender car is confiscatory; it borders, as I think, on a socialistic idea. For instance, I have that ten dollars in my pocket referred to by Mr. Hale, and I know I am able to get six per cent interest on that. Some poor fellow happens to need that money, but what rule can he make to take that legal tender from my pocket and transfer it to himself? I want to be enlightened on this subject, as to just what plan will be formulated to make a legal tender car. I can see only one thing and that is, as advocated by some critics, government control. I could not agree with them, but with government control the cars would be placed where they are wanted.

I may have gone a little too far and I hope I will be enlightened as to just what plans we are going to have in regard to that legal tender car.

MR. HALE: I share with the gentleman who has just spoken the desire of knowing just what kind of plan we are going to have for a legal tender car. I am just as curious about it as he is. I think, if I remember rightly, I began my remarks by saying that the Committee on Car Efficiency had made less progress in arriving at a solution of the legal tender car question than they have of any other question.

The proposition we made we did not think confiscatory; it is something on this line. The proposition was that, say, ten railroads should each put into a pool 5,000 box cars; those box cars to be as nearly alike as could be and those ten railroads should agree to use those cars in common. Those railroads should agree that if one used more than his share, he should pay for that excess the amount the car would earn for that railroad. The matter would be subject entirely to agreement; and only if the railroads would go in and agree to a policy of that kind. Now, we have not got the ten railroads to put in 5,000 cars each, so that the plan has not worked, and I can assure the Western Railway Club that nothing confiscatory has occurred to the Committee on Car Efficiency. We felt that if a pool of 50,000 legal tender cars worked with ten railroads, that very possibly a pool of a million box cars would work on 500 railroads of the United States, always supposing they were willing to try it.

But, gentlemen, as the word "confiscatory" has been used, I would like to call the attention of the Western Railway Club to what really went on during the last period of car shortage and possibly they will call that confiscatory. In April, 1907, which was the period when there were 100,000 cars short in this broad land, there was a certain railroad that owned 19,000 cars; it had in service on its own line 15,000 of those 19,000 cars, that is, it permitted 4,000 to go to the other roads and it was using 24,000 foreign cars; it had an excess of 20,000 cars on its line above what it owned. I do not

know whether that was confiscatory or not, but that was what was happening when the country was 100,000 cars short. Do you suppose the shippers on that road were short of cars? I do not think so. There was not any very evident shortage on the reports they made to us. Now, this happened simply because there was not any legal tender car arrangement; simply because that road happened to be a distributing road, a road to which the cars came naturally, and that road very naturally kept hold of the cars that came to it and filled its orders. That is what is happening, gentlemen, under the present lack of system, and yet, as I said, the creditor roads have not as yet admitted that a pooling arrangement, a legal tender arrangement, would be a good thing. They want their own cars back and they come to the American Railway Association year after year and say, "Give us a penalty for the diversion of cars, a penalty for delay, give us our own cars back," and the American Railway Association does not give it to them. Well, you can call that hard names, too, but the thing that is happening and the thing that will happen just as soon as there is a shortage again will be that the roads in good strategic positions will hold on to the excess cars and use them.

Now, let us take the other side of the thing. Here is an originating road, that owned 83,000 cars; out of those 83,000 cars it only held on, for that same month, to 45,000, and got 22,000 foreign cars so that the total number on its lines was 67,000 cars; that is, it only had 81 per cent of the cars it owned, that was all it did secure on its own line, and I know while the road was making the effort of its life to get its cars back and hold onto its own cars, that was the best it could do under the present system, and here was this fellow not so far away using 202 per cent as many cars as it provided.

Now, I am not agitating any system, I am not an advocate. If you do not like to call it a legal tender car, you can call it something else. I am a little afraid of the diversion penalty and of the delay penalty, because from what I have seen of it I am very much afraid it will result in a tremendous amount of expense to shippers and to railroads, in getting a particular car that is marked with a particular number back to a particular road, but that would be better than the situation of things we had in the last car shortage; that would be justice at any rate. Now, if the legal tender car would get the same result for the car owner without that apparently unnecessary shifting of cars around because they happen to be painted in a certain way, I would be very glad to see the plan work out for a legal tender car.

MR. G. S. GOODWIN (C. R. I. & P.): I would like to ask Mr. Hale what steps his committee take toward reducing the congestion when they find it on different lines?

MR. HALE: Mr. Chairman, when we have full information as to congestion of freight from a certain point to a certain point, we use

our endeavors at the shipping point to postpone shipments until the congestion is cleaned up. That is, we suggest to the railroads to do what any transportation officer would do in his own district. We cannot put on any embargo. On the B. & O. R. R. I know where the stuff is coming from and I will attempt to get it cleaned up or route it another way, but all we can do on the committee is simply to say to the people shipping freight, "now here is all this stuff on the road, kindly hold off, the consignee does not really need it;" or on occasions we have gone to the consignee and have said, "Will you not hold off shipment? There are so many cars on the road for you; will they not fill your needs?" We have not had very much success, but we think with full information and especially with the full understanding of what we are trying to do, that we are really after car efficiency, we will have better success when congestion occurs again.

MR. MANCHESTER: I would like to ask Mr. Hale another question and that is, with the legal tender car would there be any influence that would keep that car evenly distributed over this territory, or would this originating railroad be short of cars all the time and would this distributing railroad always have more than enough cars all the time, with the legal tender car in force?

MR. HALE: That is one of the very difficult questions, Mr. Chairman. I feel myself that if the price per day of the excess were made sufficiently high, the distributing road would send the cars back. I do know this, that when we got the per diem rate up to 50 cents, this particular road of which I am speaking that was using the 200 per cent of cars, doubled its equipment. Now, if 50 cents a day would make that distributing road double its equipment, a higher rate, which might be put in under the legal tender plan, would make the distributing road that went into the pool provide itself with proper equipment so that it could return the car to the originating road. The committee can only see—and I feel sure I speak for the committee in this—that some money payment would have to be arranged to rectify exactly the inequality you speak of. I feel—and I am sure the committee feels—that it is not practicable to clothe any central body with power to move the cars; that is absolutely out of the question. No railroad in this country will give any central body power to move its cars. Railroads may come into an agreement by which they will be protected by money payment in the use of a certain number of cars, but I do not believe there will be any central body clothed with any power to move cars from one road to another, I do not think any central body ought to be clothed with any such power. It is hard enough, gentlemen, controlling the cars on a large system to order them from one division to another. Any of you who have tried that know it is a very difficult thing, even when the man in charge of the division knows when he does not do it that something will happen to him. That is

the only way we can move cars on a large system, by strict discipline, and the railroads of this country cannot be and ought not to be subject to any discipline from any central body in matters of this kind. Anything of this legal tender nature would have to be in the nature of a free agreement, people coming in and knowing exactly what the consequences will be if they take more cars than is right.

MR. DE VOY: I want to return my thanks to Mr. Hale. That is one of the fairest answers I ever heard a man make on that question, and I want to acknowledge it. When they will agree, so that no one central body shall have control. I do not want to take the words from the gentleman's mouth, for he has explained it to my entire satisfaction, but I still am convinced that we will never have a legal tender car because there will not be any body of railroads that will agree to any such thing. Nor will any central body ever make me, if I were a railroad, or you, if you were another railroad, provide a certain number of cars to meet or balance what some other road has. I believe that is an impossibility, although I say again that that is about the fairest answer to the question that can be made, in my opinion.

MR. HALE: I am very glad that is understood to be an answer and not a decision. It is not a decision, it is purely speculation, but what I want the chairman and all these gentlemen to understand is this, that unless the legal tender plan has a real advantage in it to the railroads that come into it, it never will live, and I do not know that it has. I know this, that a legal tender plan on a large railroad works a great deal better than the plan by which each General Superintendent pushes "and pulls, and hauls, and tries" to get more than his share of the cars. I know that when the General Superintendents understand that they are working for the whole system: that they have got to give up for the rest of the system, that system can do more with its cars. I cannot help feeling that if two or three or ten systems can together devise an arrangement for helping each other out, that those particular systems will profit by it, and if those systems do profit by a legal tender arrangement, there is nothing in God's world to keep this whole country from going to such an arrangement.

MR. SYMONS: I would like to ask Mr. Hale one question with reference to the legal tender car, and that is this: In working out this proposition is it contemplated in arriving at a legal tender car to adopt a common standard car for all lines, or by equating the present equipment in capacity? To make myself more clear, I will give an example. A shipment is started from some extreme part of the country in a large car with 2,800 cubic feet capacity: it is transferred to an intermediate line that has no large cars, or do not have them handy, and they put the shipment into two cars. The two cars are delivered to another foreign road, which in turn is delayed considerably in unloading. The intermediate line which

transferred one car load to two cars, then call on the delivering line for per diem on two cars. Their answer is that the shipment was started in one car, and it is not their fault that it was transferred to two small cars, and they will consequently only pay per diem on one car. Now, is the legal tender car principle supposed to equate the equipment, thus giving the roads in interchange equal capacity rather than exchange of units, or does it contemplate eliminating or barring those small cars from service and eventually have all cars the same size, and in either case, what would the decision of the committee be with reference to a complaint where two small cars were furnished in transferring, and per diem claimed for two, while the shipment originally started in one?

MR. HALE: I can only give my own views on this legal tender question. Mr. Fish, when he spoke of the legal tender car, contemplated the gradual building of cars of absolutely one size and style, so that they would be in fact as well as in name legal tender cars and until that is approximated, it would be very difficult to have any car pool work well. As the gentlemen here are doubtless aware, when various systems have pooled their freight car repairs, they have covered that to a certain extent by making a valuation of the cars, and by crediting each road in the pool with a certain value on the equipment they put in, and by working out interest charges in such a way as to do justice to the different people coming into the pool. I do not see why the same arrangement could not be worked out in a pool in which more than one system participated. But those are extremely involved questions, and questions on which people differ. The only propositions that I have seriously made have been to make a pool of steel under-framed box cars. It seems to me, and to the gentlemen who tried to start such a small pool over a year ago that the steel under-framed box cars then in existence were near enough alike to be considered legal tender cars among themselves, and my suggestion, in case any number of people agree to try it, would be to have the cars put in as near alike as possible in order to avoid those questions.

Now, as to the question of the large and small car demurrage, is it about per diem or demurrage?

MR. SYMONS: Yes, demurrage and per diem. I am speaking of demurrage on cars held at the point of destination and per diem on foreign cars, the objections being based on the fact that the bill of lading shows that this shipment started from its original point in one car and it is not the fault of delivering line that it came to them in two cars, they objecting to per diem on two cars, offering to pay per diem on one car as the shipment only required the capacity of one car.

MR. HALE: Demurrage, you mean?

MR. SYMONS: Both demurrage and per diem.

MR. HALE: The demurrage rules are filed with the Interstate

Commerce Commission, and as they apply absolutely to the car involved, I do not see how any railroad could legally do anything but collect demurrage on both cars. I would not hesitate to defend such a case if it were brought before the Interstate Commerce Commission in a suit for demurrage; I think the railroad would certainly win out.

MR. WM. FORSYTH (Railroad Gazette-Age): I would like to move that we tender a vote of thanks to Mr. Hale for his address and his patience in answering questions. Seconded.

THE PRESIDENT: It has been moved and seconded that the Western Railway Club extend a vote of thanks to Mr. Hale for his very interesting and instructive paper, I believe I will ask for a rising vote on that question. All in favor, please rise.

Carried unanimously by a rising vote.

THE PRESIDENT: Mr. Hale, on the part of the Western Railway Club I wish to extend our hearty thanks for your kind interest in furnishing the paper of the evening.

I would like to ask those who are present who have not already done so, to register, put their names in the box before you leave. I think there is quite a number who have not done that.

If there is no further business, the meeting will stand adjourned.

Adjourned.



The David L. Barnes Library

SPECIAL NOTICE.

The David L. Barnes Library of this Club, at 390 Old Colony Bldg., Chicago, is open for the use of members and their friends, and we hope it will be used freely. It is open on week days from 9 a. m. to 5:30 p. m., except on Saturday, until 3 p. m. Books must not be removed from Library, but the Librarian will assist visitors in finding information and will promptly reply to letters from out-of-town members desiring information from the Library. Donations of books and technical publications will be gratefully received.

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OFFICIAL PROCEEDINGS
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The regular monthly meeting of the Western Railway Club was held at the Auditorium Hotel on Tuesday evening, October 20, 1908. President M. K. Barnum in the chair. The meeting was called to order at 8 p. m. The following members registered:

Allison, W. L.
Axtell, G. F.
Barnum, M. K.
Benedixen, J. H.
Bentley, H. T.
Blatchford, C.
Brown, S. D.
Butler, L. E.
Calehan, J. D.
Callahan, J. P.
Carscadin, C. A.
Chadwick, A. B.
Chisholm, J. E.
Clark, F. H.
Clark, R. B. Jr.
Crawford, J. G.
Crownover, G. M.
Curtis, J. D.
Darby, I. W.
DeLong, F. T.
DeMoss, Ira
DeVoy, J. F.
Denney, G. C.
Dewar, J. I.
Dodd, T. L.
Dow, G. N.
Edwards, F. W.
Elliott, J. J.
Ensign, H. W.
Faragher, R. S.
Fenn, F. D.
Finnell, H. W.

Fitzmorris, Jas.
Flavin, J. T.
Fogg, J. W.
Forsyth, Wm.
Fowler, W. E. Jr.
Fromm, A. B.
Fry, C. H., Jr.
Garrett, M. A.
Goodnow, T. H.
Gowing, J. P.
Graves, F. O.
Graves, R. I.
Hahn, F. W.
Haig, M. H.
Harris, D. T.
Henderson, T. D.
Hennessey, J. J.
Hibbard, M. W.
Hill, G. H.
Holcomb, W. B.
Hopkins, G. H.
Hunter, P.
Jacquette, W. O.
James, Geo.
Jennings, A. J.
Jennings, D. F.
Jett, E. E.
Johnson, C. H.
Jones, M. T.
Kelley, H. D.
Kennedy, Chas.
Kerr, H. H.

Kipp, A. R.
Kleifgen, Geo.
Kucher, T. N.
Lapham, Chas.
Leigh, E. B.
Leigh, E. F.
LaRue, H.
Libkeman, W. A.
Lickey, T. G.
Lovell, C. P.
McAlpine, A. R.
McClain, H. O.
McCormick, A.
McNaughton, Jas.
Mackenzie, D. R.
Macpherson, A. F.
Maher, J. T.
Manchester, A. E.
Marea, M.
Mertz, P. P.
Michael, L. P.
Mills, G. F.
Monroe, M. S.
Morris, T. R.
Moulton, W. B.
Neff, J. P.
Osman, H. L.
Osborn, C. H.
Otley, B. F.
Park, H. S.
Parsons, O.
Peck, C. L.

Peck, P. H.	State, R. E.	Thompson, E. B.
Price, Robt.	Steinke, E.	Towsley, C. A.
Riddell, Chas.	Stubb, F. W.	Walker, E. H.
Ryder, G. E.	Studer, F.	Walsh, A. F.
Schraag, C. F.	Sweringen, F. H.	Warner, H. E.
Schroyer, H. H.	Symons, W. E.	Webb, E. R.
Scley, C. A.	Tawse, W. G.	Willecoxson, W. G.
Shaw, H. P.	Taylor, J. W.	Winn, C. F.
Slaughter, G. F.	Templeton, W. B.	Woods, J. L.
Smith, J. S.	Tetlow, E. W.	Wymer, C. J.
Spearman, W. J.	Thomas, C. W.	Zealand, T. H.

THE PRESIDENT: Gentlemen, we will call the meeting to order. The minutes of the last meeting have been printed and distributed, and unless there are some corrections, they will stand approved.

The Secretary will now read the list of new members that have been passed upon by the Executive Committee today.

THE SECRETARY:

NEW MEMBERS

Name.	Occupation.	Address.	Proposed
Harry F. Kellogg, M. E., C. N. Y. & B. Rfg. Co., Chicago..			G. T. Anderson
Wm. Miller, V. P. Adreon Mfg. Co., Chicago.....			F. L. Gordon
H. Comlossy, Natl. Tube Co., Chicago.....			H. T. Bentley
R. B. Hayes, Genl. Shop Foreman, C. B. & Q. Ry. Platts- mouth, Neb.			Wm. Baird
L. L. Yates, Supt. Repair Dept. Pac. Fruit Exp., Los An- geles, Cal.			E. A. Gilbert
Henry Englebright, M. C. R. So. Pac. Co., W. Oakland, Cal..			E. A. Gilbert
Jas. Hall, A. G. F. C. D., So. Pac. Co., Sacramento, Cal.....			E. A. Gilbert
A. T. Yilson, M. C. R., So. Pac. Co., Sacramento, Cal.....			E. A. Gilbert
Thos. Dembar, Mgr. Pullman Car Wks., Pullman, Ill.....			C. W. Pflager
J. F. Mann, G. C. F., P. M. R. A., Saginaw, Mich.....			Jno. Troy
J. H. Stubbs, G. F., K. C. So. Ry., Pittsburgh, Kan.....			M. K. Barnum
J. J. Keleher, Dist. For. U. P. R. R., Council Bluffs, Iowa...			G. H. Likert
H. P. Shaw, Sales Agt., Amn. Steel Wks., Chicago.....			J. T. Maher
F. R. Fitzpatrick, Spec. App. Penna. Lines, Ft. Wayne, Ind.			W. A. Jones
P. B. Bogert, Amn. Fdy. & Furnace Co., Milwaukee, Wis....			J. W. Taylor
J. L. White, Pres't. Office, Wabash R. R., Chicago.....			J. W. Taylor
A. J. Passino, Sec'y Brady Brass Co., Jersey City, N. J.....			D. M. Brady
R. P. Simmonds, Green, Tweed & Co., Chicago.....			J. W. Taylor
B. T. Neeley, Jenkins Bros., Chicago.....			J. W. Taylor
A. McCormick, Supt. Hicks Loco. & Car. Wks., Chicago Heights, Ill.			M. S. Monroe
C. F. Bowes, Mgr. Lukenheimer Co., Chicago.....			E. W. Tetlow
H. H. Kerr, Westinghouse, Church, Kerr & Co., Chicago....			M. K. Barnum
P. P. Mirtz, C. D., L. S. & M. S. Ry., Elkhart, Ind.....			C. A. Towsley
A. F. Baker, Car Foreman Chicago Southern Ry., Crete, Ill.			J. J. Curtis
Jno. Havron, V. P., Latrobe Steel & Coupler Co., Chicago, Ill.			Jay G. Robinson

RESIGNED.

D. Cunningham	G. H. Bremner	W. T. Diehl
Thos. I. Taylor	J. C. Shaffer	J. C. Fox
Mord Roberts	L. E. Wolgemuth	W. H. Flynn
T. P. Wilbur	J. D. Driscoll	M. J. Drury
H. M. Wilson	W. T. Williams	S. B. Wight
A. R. Raymer	C. L. Ransom	G. R. Parker
H. P. Latta	W. L. Jacoby	H. N. Hough

Membership September, 1908.....	1,508
New members approved by Board of Directors.....	25
	1,533
Resignations	21
	1,512

THE PRESIDENT: Gentlemen, I take pleasure in introducing to you the speaker of the evening, whose subject has been announced in the circular sent you. It is hardly necessary for me to make any long introductory speech, as the speaker is well known by reputation to you all. He will give you the details of his speech in his own way, which I am sure is most interesting. I wish to introduce Mr. E. W. McKenna, Second Vice-President of the Chicago, Milwaukee & St. Paul Railway Co.

A CONSTITUENCY WITHOUT REPRESENTATION.

MR. E. W. MCKENNA (Vice-President Chicago, Milwaukee & St. Paul Ry.): Mr. President and Gentlemen of the Western Railway Club: I was invited by your Secretary to address your membership at this meeting and he gave me the choice of a subject. The subject I have chosen is as stated in the notice that has been sent out, "A Constituency Without Representation."

There are approximately 3,300,000 citizens of the United States, investors in bonds and stocks of railway companies, employes of railroads, and persons engaged in the manufacture and sale of railway supplies, whose vital interests in the pursuit of life, liberty and happiness do not seem to have been the concern of any one.

These interests have been the subject of attack by all the factions of militant political parties, and to some extent by users of railways, and the two forces have worked together for legislation, in some instances directly fixing maximum rates for transportation of passengers and freight (usually upon a basis much less than that which previously prevailed), or by the institution of commissions in various states and in the national government; and they have set their faces strongly against any increase in railway rates, and exercised a potential campaign for the reduction of revenues, from whatever source it might arise.

The aspect in respect to the first enumerated class is well known. Political leaders, desirous of obtaining power and prestige, have appealed to the plastic minds of a large mass of the citizens of the country, who are not inclined to economic thought, and instilled therein the erroneous idea that the transportation interests of the country had in all the past placed unjust charges upon them for their transportation, and appealed further to their selfish interest in the thought, that by the processes, which have been existent during the past few years, each would have to pay less money for his transportation, and that no baneful results could come to them, as

it was all gain and no loss, and if any loss must ensue, it must fall upon a non-resident plutocracy, for whom they felt no concern.

Discussing the position of the second class, while conceding them the entire right to take any position upon this question that seemed right, it is evident that they argue only the advantage of the day, in a lower basis of transportation charges. A proper economic study of the question might have brought to their minds the conclusion that the advantage of the day would be lost many times over in the disadvantages that must accrue to the future under the conditions this line of policy would induce.

The experience of the period from the close of the fiscal year 1898 to the same time in 1906 (the statistics for 1907 having not yet been issued by the Interstate Commerce Commission, notwithstanding sixteen months have elapsed since the close of the fiscal year), proves conclusively that the commercial and industrial expansion of the nation is governed absolutely by the ability of the transportation companies to afford the necessary facilities for the safe and efficient exchange of commodities.

The tonnage carried by all the railroads of the United States for the fiscal years 1898 and 1906 was as follows:

<i>Year</i>	<i>Tonnage</i>	<i>Tonnage Mileage</i>
1898	863,628,605	114,077,576,305
1906	1,631,374,219	215,877,551,241
Increase	767,745,614	101,799,974,936
Per Cent	89%	89%

The above figures indicate that the commercial and industrial expansion over the period above quoted required the railroads to provide transportation for a progressive increase in tonnage, amounting in the aggregate to 767,745,614 tons, or 89%. The structure and equipment of the railroads, as they existed in 1898, were totally inadequate to the task of moving the increasing tonnage from year to year, and the investment of a very large amount of money was necessary to develop new facilities, representing property at terminals, main tracks, sidings, locomotives, cars and all the appurtenances of the transportation business.

The capitalization of the railroads of the United

States on the first mentioned date was.....\$10,818,554,031.00

On the date last mentioned, this capitalization
had increased to..... 14,570,421,478.00

Of the new lines, there were constructed during
this period 37,692 Miles

Which, estimated at \$40,000 per mile for construction and equipment, produces a total of 1,507,680,000.00

Deducting this amount from the new capital invested in railroads, there remains the sum of. 2,244,187,447.00

which represents the sum contributed by investors for the expansion of the older railway properties, in order that transportation facilities might keep pace with the expansion of trade and commerce.

In 1898 the average rate per ton per mile on all tonnage moved upon the railroads of the United States

was..... .753 Cents

In 1906 the rate had decreased to..... .748 Cents

Representing a decrease of..... .005 Cents

These figures are taken from the records of the Interstate Commerce Commission, and may be relied upon as being correct; and they present the amazing condition that, notwithstanding the advance in price of every other commodity, the rate per ton per mile, which is the unit in railway freight transportation, actually shows a decrease. Is this condition consistent with the value which has been added to every other commodity or form of service during the eight years under discussion? Is it possible to segregate the business of transportation from all other business, and fix its maximum earning power per unit of service, and establish the economic contradiction that the transportation system of the country shall be prosperous, with a fixed and inflexible basis of rates and a flexible range of expense, which latter has always been in the ascending scale during the period from which these figures are taken?

To the ordinary thinker this proposition is anomalous. It is true that the railroads were prosperous during this period of eight years, due to the increased volume of business placed upon their lines, and, as you well know, volume represents the highest economic results in operation; but the ratio of expense, through the well known causes above described, has continued to increase, while the rates of transportation have actually shown a decrease.

If this condition is to obtain, that railroads may not increase their revenues through increase in rates, and must increase their expenses through increase in cost of the commodities which are necessary in the operation of their properties, what must follow?

You have had an exemplification of this condition during the past year. Just about one year ago conditions culminated which induced a falling off in the traffic of railroads. The gross revenues of the railroads within that period decreased approximately 16%.

Statistics have also been made up covering 96% of the mileage of the United States, which show that the earnings of the first quarter of the year 1907--the most prosperous in railway history--were \$955,351,000.00.

At the end of this quarter the panic broke upon the country,

and the earnings of this same 96% of the railroads, for the next ensuing quarter, were \$747,939,000.00, showing a falling off in gross earnings of the immense sum of \$207,412,000.00 or 22%.

Previous to the panic the spread between railway revenues and expenses was not so wide that they were able to indulge in extravagances. In other words, the roads were worked as closely as could properly be done, in order that they might be kept in a condition that would insure safety and efficiency. Part of this enormous loss quoted above has been saved by reduction of expenses; as the financial writers rather amusingly put it, "railroads have gotten control of their expenses." There is not a body of men in the world who are better able to appreciate the unconscious irony of this expression than yourselves. It is true, railroads have reduced expenses by cutting off everything that represented improvement of their properties, but the greater volume of reduction has been taken out of the vital structure of these properties, and all the money that has been saved by "railways securing control of their expenses" represents depreciation in the condition of the properties, which means that they have borrowed from the future, and this debt must be paid at various rates of interest, running as high as 200%. You are all aware that there is no property in the world that is so sensitive to depreciation as the property of a railroad, both in physical structure and equipment. Failure to apply the necessary dollar at the right time inevitably entails the application of that sum, with a very considerable addition, when the results of the enforced neglect bring the inevitable day of reckoning.

During this unfortunate period the great preponderance of the mileage of the United States has been able to meet obligations and keep the properties in reasonably safe condition, looking hopefully to the future for betterment of conditions, which will permit the railways to take up this depreciation from current revenues.

What is to be the end of this? If the conditions herein discussed are to continue, and railroads are rendered powerless to make head against the volume of influence which has depressed their revenues, and the natural conditions which have increased their expenses, it must follow that the present owners of the fourteen and one half billions of dollars invested in railway property will realize that the security upon which their faith was placed has been undermined, and from what sources then will the new investment come that is necessary to conserve existing properties and enable them to meet their responsibilities, and to build the 200,000 miles of new lines which are yet necessary for the development of the internal resources of this country?

As a whole, the railroad system of the United States during the past twelve months has depreciated in greater or less degree, as the necessities of particular companies made necessary. If the confidence of railway investors is destroyed and the present returns on

railway investments, which in all conscience are not excessive, are further reduced, then will result the inevitable struggle that a railway goes through between a condition of reasonable affluence and pending bankruptcy. Before the last plunge is made, the struggle to avoid the inevitable results in a deterioration of the property, which places it in such condition that it is not able to perform its duties either safely or efficiently, and the waste of its physical structure and depreciation of its securities held by investors represents an economic waste which, in the first place, falls upon those directly interested, but in the end, as a broad economic question, is a loss to the commonwealth.

The industrial and commercial prosperity of the country is absolutely governed by the efficiency of the railways in making exchange of commodities. This has been amply demonstrated during the past eight years, and if the present forces at work should produce the dire result, of forcing railroads to continue in their present path, of being compelled to allow the properties to depreciate, the industrial and commercial community can look forward with full assurance to the fact that it will be a work of years before railroads can be restored to the plane of efficiency that would admit of handling a tonnage equal to that of past periods. Then industrial and commercial expansion must wait until railway efficiency is restored. If this restoration is based upon rehabilitation of railway credits, then "he who runs may read" how long a period will be required to bring about restoration of credit and the physical upbuilding which must follow; and the conclusion may be borne in upon the mind of the whole country that a slight increase in rates—a small share of the prosperity of the country—at this time would have been better than the losses entailed by a depreciated condition of the transportation system due to this starvation process. It seems that these conditions must certainly follow, unless railway investments are placed upon a basis so secure that the interests, which have previously used their means for this purpose, can continue to do so, with the full assurance that their property will not be confiscated and that they may safely rely upon a reasonable return from their investments.

To avoid this threatened condition, it is absolutely necessary that railways be permitted, under proper supervision, to increase their rates to a point which will yield the required means to maintain and preserve the properties, with a safe margin to pay a fair rate of interest upon the money invested in the properties.

The discussion up to this point has touched upon causes and economic effects, as applied to the public at large. What pertinence has it to the large body of investors who own the railroads, and the immense army of men employed in their operation, and that other army of men employed in providing the supplies necessary to carry on that operation?

The increased plane of wages, induced by the very prosperous condition of the nine years ending November 1st, 1907, was fully in evidence upon the pay rolls of the railways of the United States. In this respect they have met their full responsibilities as to a distribution of the advantages of prosperity.

There is no effect without a cause. The panic of last October for a time adversely affected all classes of society. As soon as the banks, by use of the most heroic measures, succeeded in allaying the worst effects of the money panic, and partially restored confidence in almost all lines of commerce and industry, there was a gradual ascent toward former prosperity, except in the matter of production of railway supplies and the business of transportation. Why have the effects of the panic been most hurtful to those two interests, and why have they been the slowest to commence the march toward prosperity? What was the cause that produced the effect, that these two great interests should be the greatest sufferers from the unfortunate conditions that culminated in October last, the baneful effects of which are still existent? Intelligent observers can read between the lines, and reason from the cause to the effect.

Notwithstanding the extremities of the railroads during the current year, the status of wages paid by railway companies remains the same as during the pre-panic period. By heroic measures railways have been enabled to live through the period of depression up to the present time, without being forced to meet the question of reduction of salaries and wages, feeling that the higher economic way pointed to a slight increase in the rates of transportation, distributed over the entire population of the United States, rather than to place a specific burden upon one and one half millions of men now in railway employment. They were further deterred by the fact that any attempt to reduce wages would probably induce an industrial war, which would be more hurtful in its effects upon all the interests of the nation than the evils following the panic. If a cure for present conditions is not found to be a return of conservatism and a true application of the square deal to railway properties, then the latter, for their own survival, must ask labor to share in the enforced economies, which are necessary for their existence. Can the great constituency now under discussion do anything to ward off the evils with which it is threatened? There are numerous instances in the political history of the United States where special classes have organized for their own protection, and the time has come for an organization of the immense body of citizens, on whose efforts depend the comfort and happiness of seventeen millions of the population of the country, so that they may have a voice in the councils of the municipality, the state and the nation, and be enabled to speak in a tone that will command respect. The intelligent wageworkers attached to these interests who are smarting under this unmerited punishment, the

result of brutal economic ignorance, and the representatives of investors in railway property have been moved by a common impulse to pool their interests and do what they can to protect themselves.

An association has recently been formed, under the title of "THE AMERICAN RAILROAD EMPLOYEES AND INVESTORS ASSOCIATION," the objects of which are stated in the following articles:

"The purpose shall be, by all lawful methods, to cultivate and maintain between its members such a spirit of mutual interest and such concern on the part of all of them for the welfare and prosperity of American railroads as will best promote their successful and profitable operation for the benefit alike of their employes, investors and the public;

"To encourage, by every proper method, cordial and friendly feeling on the part of the public toward American railroads and their business;

"To publicly provide means and methods for obtaining consideration and hearing from all legislative bodies and commissions empowered to enact laws, rules and regulations affecting the conduct and operation of railroads;

"To do whatever lawful things may be necessary in order to secure a fair return alike to capital and to labor invested in American railroads, with due regard at all times to efficient service, fair treatment and safety to the public;

"This Association shall at no time be used for partisan political purposes, nor shall it take any part in controversies, if any, which may arise between railroad employes and railroad officials;

"Its membership shall consist of representatives of railroad employes and investors; and

"The by-laws of the Association shall make provision that each of the interests represented in the Association shall have an equal voice in the conduct of its affairs."

You are all aware that in the past several years there has scarcely been a voice raised in behalf of this constituency to combat the selfish public opinion which has worked so strenuously for its own advantage, as against corporations, in any deliberative law-making body in the United States.

The time has now arrived when the effort must be put forth to inculcate in the minds of all persons whose well being is associated with the transportation interests, directly and indirectly, a thorough knowledge of the forces which have been working to their detriment in the past, and contain a portentous threat for the future; and out of this knowledge bring forth a militant potential organization—an organization whose energies shall be directed to the conservation of the interests of its members, and insistently and persistently demand that it shall have representation at all times and in all places where its interests, in common with the interests of other citizens of the United States, are being adjudicated.

Have the upwards of three million citizens of the United States represented in this constituency, a right to demand representation? Have the interests of upwards of seventeen millions, dependent upon them, the right to be heard? Is it right that seventeen millions of the population of the United States should be specifically legislated against, that the other sixty-five to seventy millions may have a greater share in the prosperity that should be common to all?

Every person within the sound of my voice has a direct interest in the evolution of this question. The watchword should be "EDUCATE." To those who have the cast of mind that enables them to work out this proposition for themselves, is given in charge the matter of imparting to others, who have not taken the subject into their consciousness, the lesson of where their interest lies. Through the result of this labor you will be potential in solving the question—"SHALL THIS GREAT CONSTITUENCY REMAIN UNREPRESENTED?" (Applause.)

As I understand, it has been the custom of this Club when anybody makes an address, to be prepared or endeavor to answer questions that may be put to him. If there is any person that wants to address any question on the subject, I will answer it if I can.

THE PRESIDENT: Gentlemen, you have heard this very interesting address of Mr. McKenna, which certainly contains much food for thought. I think there is not a person here to whom this question is not of vital importance. Probably most of us have felt during the last three or four years that our interests were not being fairly represented in the law-making bodies. For example, in eleven of the states in the Middle West, during the last session of the legislatures, over 800 bills were introduced, and over 100 of them passed and made laws which were calculated to affect the railroads, but none, so far as the railroad men have been able to discover, were intended either to increase the revenues or decrease the expenses. I believe that most of these laws originated in prejudice and lack of correct information on the part of those presenting and voting for them. They undoubtedly felt that they could gain a personal advantage, an advantage for those that they considered their constituents, at the same time injure the railroads and yet escape themselves scot free. This has proven to be a mistake, as many here know, and as many of the law-makers now know.

Now, it seems that there has been some change of spirit on the part of the general public and that must inevitably affect the law-makers when they assemble again, and, as Mr. McKenna has very plainly shown, what is most necessary now is education; education of the railroad men themselves first of all, so that when they meet their friends who are in other lines of business, who complain about freight rates or passenger service, they will be able to explain why

the service cannot be improved while at the same time the revenues are reduced.

I have found that many people who complain about passenger service—and it seems natural for most people who travel to complain about something—do not realize that the reduction in rates has made it impossible to carry on the improvements for which the railroads had large plans before those reductions took effect, and if the railroad employes are well informed they can make explanations which will do much good to the general public and at the same time benefit themselves.

The Association which Mr. McKenna describes has as its principal object education of the public and the bringing about of a better and more thorough understanding between them and the railroads, and every one here is in position to do much to forward the work, which I trust will spread rapidly as soon as the plans are ready.

We shall be glad to hear any questions or comments, as there are many here who know how these prejudices and this lack of information have affected their railroads. There are others here who are dependent upon the railroads for their incomes, being in the supply business, and can say a few words which will help this movement. Gentlemen, the question is before you.

MR. W. C. SQUIRE: Mr. McKenna has called attention to the fact that one of the leaders of the largest railway labor organizations has been made president of this new organization. I think it will be very well, if Mr. Morrissey is in the room, to call upon him to state his general idea of the subject, because he must have been in the councils from the beginning.

THE PRESIDENT: We shall be glad to hear from Mr. Morrissey, as he will be in position to give us information which will help this movement. Is Mr. Morrissey here? It must be a mistake, Mr. Squire. Mr. McKenna has expressed his willingness to answer questions, and I hope you will avail yourselves of this opportunity. Mr. McKenna, will you please explain briefly what the plans of operation of this Association are?

MR. MCKENNA: So far as it has gone, it has been an association of railroads principally converging in Chicago that entered into the Association with the members through the chiefs of the orders of engineers, conductors and trainmen; I am not so certain about the firemen. An organization has been formed, and the matter has been taken up with other railroads of the country with a view of making the organization as wide as the evils are that have been forced upon the railroads, and the first theory of education must apply to our own people; to the men I spoke of in my address as not having taken the subject into their consciousness; men who have not realized that their interests are being affected by the performances of some of the eminent politicians of the United States

and who really by their own votes have put these people in a position where they can injure them. A usual way to political preferment in the past few years has been by making attack on corporations. I know, for instance, where such men have been elected by votes of railroad men, men on the pay roll of railroads, whose interest was vitally involved in the question, and that is the form of education I had in my mind when I said "Education."

You gentlemen can educate through personal contact and through your organization; you can educate the men on the pay-roll of the railroads that these people are persistently and earnestly and directly hurting them. That is the first object, and in fact the influence of these orders will be helpful. As Mr. Morrissey said in a very striking way, "The millenium has not come yet; this does not mean that the differences between the railroads and the orders have all been abandoned, but," he said, "before we quarrel over the loaf we will join with you and get the loaf."

We have all escaped very narrowly, I mean all the railway men, having some certain or uncertain per cent taken from our income. None of us like that. As far as railroad men are concerned, I am frankly able to say that none of them get enough as it is, and I think we can confidently look forward with an increase of rates, to getting something more. (Laughter.)

THE PRESIDENT: May I ask you to explain how membership in this Association will be obtained?

MR. MCKENNA: The plans are not formed yet. Mr. Morrissey, the president, was formerly president of the Brotherhood of Railway Trainmen and who, by the way, is an economist of high caste, a man of great ability and force. He has been elected president of this organization. I think I am qualified to give him a certificate of character, because I sat with him in labor disputes and he was one of the hardest men to deal with I ever met in my life. But he is able, absolutely fair and capable, and he will put the organization in shape as soon as he can wind up the affairs of the office he is leaving. I understand his first object is to get out some educational letters to reach the employes, and a membership badge of some kind will be given, probably a button to indicate membership in the organization and also to bring about the co-ordination with Mr. Post's organization, the Railway Business Men's Association, so as to bring in all of the elements. Steps will also be taken so that the educational matter in this connection will be distributed to the six or seven hundred thousand holders of railway securities.

Notwithstanding what has been said about swollen fortunes and plutocrats and that sort of thing, the average holdings of the holders of stock on the Chicago, Milwaukee & St. Paul road is less than two hundred shares per individual. I wish to correct that—the average holding is less than eighty shares. That represents probably about the average on other roads, and the stock of standard

railways is very largely held in that sort of ownership and it seems to me that the effort of the government should be to protect those interests rather than attack them.

MR. A. E. MANCHESTER (C., M. & St. P. Ry.): I have been a member of the Western Railway Club for many years and I have listened to arguments and discussions on almost all subjects that pertain to railroading, but I am very pleased indeed tonight that Mr. McKenna has brought out the line of thought he has. I have felt for many years that railroads were suffering from adverse legislation very largely because they had never done any talking along these lines. Indeed, I do not remember in connection with railroad organizations or railroad bodies ever hearing but two discussions of this kind, and the one was by Mr. Post, of Atlantic City, last summer, and the one that we have just listened to tonight.

I do not believe the people of this country are disposed to be unjust to railroads, or to be unjust to any special class of industry or people, but if one class of interests are constantly attacked and never answer or never come into print or controversy in connection with the subject, it seems to leave the impression with the people that all that is being said is true, and that therefore what the demagogue says is something that they have a right to feel they should take an interest in and promote.

The president referred to legislation that has taken place within the last two years in a great many of the states. Much of that legislation would have been different had the people been better informed upon the subject and had the railroad interests, the employer, the employe and those whose interests are so closely allied, been better prepared or had better posted themselves on these subjects and had stood out and expressed themselves plainly.

A few years ago it devolved upon me to make an inventory of the property, the rolling stock and machinery of the road with which I am connected, in order to furnish to the state, or one of the states, information as to the ad valorem value of the property for taxation purposes. Extreme care was taken in preparing the figures in the department that I represent, and I know that equal care was taken in all of the other departments. The state spent a great deal of money with a corps of engineers obtaining the same information, and after all that immense amount of figures and inventory were gotten together the state inventory amounted to something over \$51,000,000 and the railroad's engineers about \$49,000,000. They got together probably as close or closer on a large valuation of diversified property of that kind than is often done by private interests. But when those figures were returned to the powers that were in control in the state it was not going to give the relief that the politicians had predicted. In fact, the state had been getting its revenues from the railroads on a license system, but the actual property as valued by either the state's or the railroad com-

pany's engineers and assessed at the same rate as other property in the state would have given considerably less revenue to the state than they had been getting before, so when the figures were presented and some argument brought forth to try to reconcile this small difference between \$49,000,000 and \$51,000,000, the railroad representatives were given to understand that it was not necessary to go into that very lengthily; that their assessment would be \$73,000,000. That was necessary in order to bring out what the politicians had told the people of the state they were going to do for them. But my belief is that had the people of Wisconsin been entirely familiar with the situation and known all of the facts as they were they would not have stood back of the people who were agitating the increased taxation of railroads and an increased taxation on a higher level than any other property in the state was taxed.

The president has also referred to the two-cent fare proposition. In Wisconsin the two-cent fare question was thoroughly canvassed by a very competent board and they reported to the legislature that two and one half cents was the least that the railroads of that state could afford to carry passengers and have the passenger department stand its full and equal share of the burdens of the maintenance of the property, but even with that information before them the legislature, feeling that there was a pressure at their backs that demanded them to do so, passed the two-cent fare and it was approved by the governor, and the gentleman who was at the head of the commission, who had thoroughly investigated and reported upon this proposition, resigned his position as such. I heard him in a speech made at the Pabst Theatre at Milwaukee state that he was in one of two positions, that he had either been dishonest to his trust and to the people of the state of Wisconsin in making reports to the legislature that two and one half cents was the most that they could stand, or else he was a rascal; he was either a fool or dishonest, and he was not going to stand for either of those assertions, and consequently he resigned his position, and the people of Wisconsin were so well pleased with his action in that case that they made him a member of the Supreme Court at the last election.

I think it is all a question of education; that if the people are educated they will not bring the pressure to bear. I believe in educating them, and the owners and the employes and those who live upon the using of their material are the ones to do this.

THE PRESIDENT: Gentlemen, I presume that the promoters of this new Association will be glad to have suggestions for their work, and surely some of those present are capable of offering good suggestions based on their experience.

One of the most common criticisms we hear of railroads is that all their stocks are "watered" and this seems to be very generally believed. In this connection an interesting case has occurred recently. The New York, New Haven & Hartford road made a re-

valuation of their entire property as accurately and fairly as possible, and that re-valuation shows that whereas they have been paying 8 per cent on the capitalization this dividend represents only 4 per cent on the present value of the property. The same condition will hold approximately true of most railroads of the United States, and it seems that it is no more fair to charge a railroad with having watered stock because their terminals and right of way and property in general, such as shop grounds, has appreciated on account of the growth of the country and increased population, etc., than it is to charge the farmer with watering the stock on which he expects to reap a dividend, because he bought at \$1.25 an acre land which he now refuses \$100 an acre for. He will not admit for a minute that his stock is watered, yet he turns right around and charges the railroads indiscriminately with having watered their stock. This is due partly to lack of information. We do not know what the railroad property is worth and the case of the New York, New Haven & Hartford re-valuation makes it look very much as if other railroads might profit and be in much better position before the public if their properties were fairly re-valued.

Gentlemen, I do not want to do all the talking, but I just want to congratulate Mr. Manchester that he does not live in Texas, where the Railroad Commission has placed a valuation for rate-making purposes of one-half that placed on the roads for taxation purposes.

MR. GEORGE HANOUR (C. I. & S. Ry.): I wish to add an argument or two to the one the chairman advanced about watered stock. I do not think it is wise to combat that argument in every instance by merely assuming or saying that there has not been watered stock, because there is not any question that there has been, but watered stock does not form the basis for the earnings of the railroads, for the rates that are made nor for the dividends they pay. The fact is known to practically every one who has watched the situation or studied the question at all, that water pumped in is invariably squeezed out, by receiverships and reorganizations, and until it is squeezed out the railroad never succeeds in competing with those the stock of which is not watered. As long as the railroad business is competitive as it is today (and it has always been so), the rates are not made by any one road and the watered railroad competes with the one that is not watered and with the inevitable result—receivership. There is not any railroad that is paying excessive dividends on the money invested. We know that our greatest lines have from year to year returned a large proportion of their net earnings into the property, made improvements and additions to the property out of their earnings. Any railroad that has watered its securities is in competition with those railroads the finances of which have been continuously well managed and whose actual investment far exceeds its capitalization.

MR. E. B. LEIGH (Chicago Ry. Equipment Co.): I have listened

with a great deal of interest to the very able and comprehensive paper by Mr. McKenna, and I take a special interest in it because of a recent meeting held in New York which I presume most of the members here are aware of. On September 30th some seventy-two or seventy-four representatives of the important business interests of the country met at the Waldorf. I had the honor of being on the committee to formulate by-laws, etc., and an organization was formed called "The Railway Business Association." The purpose of this organization is, as suggested by Mr. McKenna, "education," beginning with our own employes and extending it as far as possible, endeavor to educate them to the fact that the railroads are today the greatest factor in the business industry of the country and that work is now going on. I have to suggest, in fact I put it in the form of a motion, that the Western Railway Club officially transmit a copy of Mr. McKenna's address to the Railway Business Association, and it has been suggested that the Club also circulate this address as much as it possibly can among the railway employes, although our limited treasury may prohibit our making the circulation as extensive as we would like to. I will put that in the form of a motion.

Motion seconded.

THE PRESIDENT: Gentlemen, you have heard the motion of Mr. Leigh, which has been duly seconded, that the Western Railway Club transmit a copy of Mr. McKenna's address to the Railway Business Association. Does that comprise the whole of your motion, Mr. Leigh?

MR. LEIGH: I would say that as far as compatible with the treasury, we disseminate it among the employes.

THE PRESIDENT: And that steps be taken to disseminate copies of this address to railroad employes generally. I will ask for a rising vote on this. All in favor, please rise. It is a unanimous vote.

I will say for the information of those present that an arrangement can very readily be made through the Western Railway Club for printing copies of this address, and they be furnished to the railroads requesting them at a nominal cost. The Western Railway Club would be very willing to undertake the printing and sending out of the address, and we trust that those present will see that this information reaches the proper railroad officials, so that they can make request promptly for the number of copies desired.

MR. SQUIRE: I would like to ask Mr. McKenna how much of an increase in the average rate per ton mile would be required to make the necessary income to put the railroads in the shape they would wish to be in, so that they could live and make a fair return on a fair valuation of their properties? Mr. McKenna has showed that .753 mill was the rate a year ago and .748 mill is now the rate on the last returns, and now there must be a horizontal increase in the rate to meet the new conditions. I would like to know whether a com-

mittee or any one else interested in this matter has figured how much this rate will have to be increased and what its percentage would amount to per ton of average commodity on the actual cost of the property transported?

THE PRESIDENT: Mr. McKenna, did you understand the question of Mr. Squire?

MR. MCKENNA: No, I did not hear it.

THE PRESIDENT: Will you please repeat that?

MR. SQUIRE: You stated that the rate two years ago was seven and a half mills in this case, then you followed that up by saying that the rates had been reduced to seven and forty-seven one hundredth mills, from .750 to .747, how much above .750 would the rate have to be increased to make a fair return to the railroads, that they might give a fair return on their present valuation, or a fair valuation of the roads as you understand it?

MR. MCKENNA: In 1898, the rate per ton per mile was .753; in 1906 it was .748, a decline of .005. Now that .005 per ton per mile represented about eleven million dollars loss. An increase of one mill per ton per mile will increase the revenues of railways about \$200,000,000; under conditions that existed previous to the panic, I should say that one half mill per ton per mile added to the railroads would put them all in a very comfortable situation and enable them to meet their responsibilities.

With respect to the remark of the gentleman next to me, made sometime ago, about watered stocks and elimination of water, and all that sort of thing, if the stock owners of the railroads of the United States had received the money that has been taken from them and put into the upbuilding of the railroads, I think it would show that for all the water that was originally injected, that the stockholders' money had more than made it good twice over. The stockholder of the past has not been a "kicker" in that respect, because he felt that it was his property and the stability of his interests were secured by that method and the advantages that naturally would follow. It has not been the custom of American railroads to take their lesson from British railroads. Since the beginning of their operation there has been no money of the stockholders invested in these properties. All the betterments of every kind and character have been capitalized. That has gone on and the average per mile there is something in the neighborhood of \$267,000; that of the American railroads \$58,000. If American railroads were capitalized per mile on the same basis as British roads, the entire gross earnings of the American railroads—\$2,500,000,000—would not be sufficient to pay four per cent on the money invested.

MR. SQUIRE: One further question I would ask Mr. McKenna is this—how much will it increase our living expenses? In other words, how much would it increase the actual cost of that which we use, the necessities of life? How much more would it cost each of

us individually? Has that been estimated? I understand there is some literature on that subject; it is stated that on a suit of clothes it would amount to about two cents.

MR. McKENNA: Something like that.

THE PRESIDENT: There are quite a number of supply men here and I know that some of them are well informed and good talkers. We would be very glad to hear some suggestions or questions from them. Mr. Leigh has given us some interesting data, now let us hear from some others.

MR. P. H. PECK (C. & W. I. Ry.): Mr. McKenna's paper and the by-laws of the new Association is a move in the right direction, as its aim is to bring the officials closer together. By so doing, they can work in harmony and bring about results that could not be accomplished otherwise. I have been an employer and official for several years and find such is the case. The closest, and in fact, the only time they get together is when they meet grievance committees.

In panics, the same as last fall, the first reduction is in the pay roll; in fact it cannot be otherwise. Contracts have been let for all kinds of material and cannot be canceled so that reduction of expenses must be made through the pay roll, by reducing both men, wages and working hours. By such an organization, the whole power of all men, both high and low, can work together and get results through our legislatures.

Mr. McKenna has shown the number of tons and the cost of same and what effect a mill or so in the rates will have on the railroads. Forty per cent of the earnings of railroads are for labor alone—twenty-five per cent for material. This amount maintains a vast army of men, besides those depending on them and any reduction in hours is felt by hundreds of thousands.

MR. M. A. GARRETT: Since the supply men have been asked to say a word, I would like to say I have been a member of this Club for eighteen years and I have never opened my mouth until tonight, because I have regarded it, in the past, as in a manner inappropriate for me to say anything in the discussions here, but this is a subject that it is proper for any one to discuss, supply men and railway officials alike.

I was impressed with what Mr. Manchester said with regard to the fact that railway men have been too quiet in maintaining their rights before the public. I think they have been so busy managing and so busy executing that they have allowed the muckraker to rake and the politician to plan and the demagogue to execute his ideas in the legislatures, state and national.

I think the time has come when supply men and all citizens who look for the prosperity of our country should stand together and stand at the back of the railroads and see that they get justice. The American people love fair play and it is certainly true that

the railways have not been obtaining fair play for the past few years, and it is not because the politicians wanted to do the people any particular good that they agitated, the muckrakers did not seek the good of anybody in particular in the magazine articles which they wrote; they were unfair and untrue in a great many respects, for it was all for the accomplishing of their selfish purposes, namely national notoriety and political advancement.

We in Chicago know that for ten years the street railway question was a football of politics, and nothing could be done until politicians got to the end of the rope, and then something was done in fairness to the street railway. The same thing applies to steam railways. There ought to be a public sentiment aroused and it can be aroused by proper methods, which will seek to do justice, and furthermore, seek to undo some of the injustice that is already done.

I think we ought to be concrete in our action. Mr. Leigh suggests that a copy of this address be sent to the Railway Business Men's association. Now, that is very good, but it is not concrete enough. I think we ought to take action here tonight, or start an influence here now that will result in action of some sort or other and that would bring pressure to bear upon our legislature at its next session to undo some of the evil work that has been done. The way that can be done, in my estimation, is an enrollment of every railway employe in every congressional district in this state, in every senatorial district in this state; I believe it has been said that every twelfth man, and some one has said every fifth man, is interested in railways for his living, that is an enormous percentage of voters that could be turned loose upon politicians. There is nothing the politician is so much afraid of as organized voters and we ought to organize the voters for the benefit of the railroads in getting justice done.

Now, there is another feature particularly in reference to the matter of reduction of rates. That is one of the injustices that has been done. I was a railway contracting freight agent something like thirty years ago, and the class rates at that time between New York and Chicago were 75, 65, 50 and 35 cents. There was no such thing as a commodity rate as at present. There was no 25 cent rate. From New York to Chicago today we have that rate and we have the same class rates today between those points that we had thirty-five years ago, notwithstanding the fact that the railways have been subjected to enormous expenses in betterments and in heavier equipment and in making their roads the best in the world.

It is not fair to attempt to drive rates down or prevent a reasonable advance. The merchant can raise his price, the manufacturer can raise his price, and the railways have been getting

nothing extra; instead of that, they have been reducing their rates right along. It is not fair.

I have been particularly annoyed with the action of the Commercial Association of Chicago, where some of its leading members went into action as a committee to oppose the raising of railway rates ten per cent. I cannot understand why any business man should do such a thing, especially when you consider, as has been remarked here, that on a suit of clothes the ten per cent raise may amount to two cents. I think that we ought to stand together in aiding the roads to raise rates. We supply men ought to be a perfect unit to back up the railways in this matter of raising rates and we ought to give it every countenance that we possibly can. After Mr. Post delivered his splendid speech at Atlantic City—I had a conversation with him and said, “I am very sorry, Mr. Post, that I could not be there, but I read it in the daily press.” I said, “There is one thing you omitted, you ought to have touched on this matter of raising rates, you ought to have said that we, as supply men, whom you were addressing, should stand behind the railroads in that matter.” “Well,” he said, “Garrett, that is a pretty good idea, but I didn’t think of it; it did not occur to me.” But, just the same, I am glad this Railroad Association in New York touches upon that very thing, and there is action coming. Let us do something here tonight that is concrete, let us take some action if it is possible. If it is considered wise, let us appoint some committee to do something in that direction for the enrolling of voters. It would be a vast work, at the same time it can be done. The politicians do it right along and we can do it, and we can make our start from the pay rolls of the railways; find out what political districts those men are living in and in that way get a pressure to bear on the representatives of such districts in Congress and the State legislatures.

THE PRESIDENT: I would like to ask Mr. McKenna, if it is not one of the principal objects of this Association of Railway Employes and Investors to do just what Mr. Garrett has outlined, and enroll as many as possible of those who are personally and directly interested in the welfare of the railroads?

MR. MCKENNA: It is the design to enroll all railway employes if possible, and all railway employers and investors in the different locations in the States and educate them.

THE PRESIDENT: Mr. Garrett, has not that Association the necessary machinery to at least start the work which you have outlined, and perhaps to do it better than it could be done by any committee appointed by this Railway Club, and would it not be in a measure duplicating work for us to undertake this before we find out what they have done?

MR. GARRETT: I merely dropped the suggestion, just so something is done; let us do something concrete, let us get action.

THE PRESIDENT: The idea is very good.

MR. MANCHESTER: I would not feel that I had fully done my duty at a meeting of the Western Railway Club if I did not tell a story. It seems to me, as I have listened to the paper, and the talk here this evening, that the railways today are very much in the position of the man that was drowned. His body was found and a lady claimed him as her husband and he was taken home and the lights were lit and flowers were spread over the coffin and friends gathered and every preparation was made for a funeral, but before the time for the closing up of the casket and the moving out of the funeral to the burying ground, the corpse's mouth opened and disclosed some false teeth falling down his throat, and as this lady's husband did not have any false teeth, she disowned the corpse and said, "Take him away." And the undertaker, consequently, had to put him back into the wagon and take him off and as he put him on a slab in his undertaking room he said to the corpse, "There, you old stiff, if you had kept your mouth shut, you would have had a decent Christian funeral." (Laughter.)

THE PRESIDENT: I understand the point of your story to be, Mr. Manchester, that if the railroad people continue to keep their mouth shut, they will all be buried. I think there is no doubt about that.

Gentlemen, we will be very glad to hear from any other speakers.

Mr. McKenna, do you care to make any further remarks in closing the discussion? We shall be glad to hear anything further that has occurred to you.

MR. McKENNA: I like the spirit of enthusiasm of the gentleman who has just spoken and I like the suggestion that something concrete be done, but I am not in a position to give advice to this body, of which I am, unfortunately, not a member. It does not seem to me that any action can be taken tonight except to take to your bosoms the lesson, that the people who have not previously understood the question, who are in the supply business and in the railroad business, and to educate them and let the organization under the direction of Mr. Morrissey and Mr. Post work out the details which will accomplish the result—at least we hope that it will accomplish the result that we all so much desire. Educate. Let everybody take a turn in the direction of having people understand the question, let them understand the legislation that is specially pernicious to them, and bring the question up in plain language so that every one will understand it and so that they can intelligently use their franchise for their own personal interest.

MR. H. T. BENTLEY (C. & N. W. Ry.): Mr. President and Gentlemen—I think we all feel very much elevated by the inspiring talks we have heard, first from Mr. McKenna and from other mem-

bers here present, and particularly from our friend, Mr. Garrett. I wish that everybody in this room could have a little of the enthusiasm that Mr. Garrett displayed and if we did, I am satisfied that the politicians would have to run.

The meeting has been a very satisfactory one as far as I am concerned, and I think as far as the members generally are concerned, and I think the proper thing to do to close the meeting is to render a very hearty vote of thanks to Mr. McKenna for his admirable address, and I move you, sir, that we do so.

Motion seconded.

THE PRESIDENT: Gentlemen, it is moved and seconded that the Western Railway Club extend a hearty vote of thanks to Mr. McKenna for his admirable address. All those in favor of the motion will signify by rising.

Motion carried unanimously by rising vote.

THE PRESIDENT: The vote is unanimous, Mr. McKenna, and it affords me much pleasure to convey to you the thanks of the Western Railway Club for your address.

Gentlemen, if there are no further remarks, the meeting will stand adjourned.

ADJOURNED.

The David L. Barnes Library

SPECIAL NOTICE.

The David L. Barnes Library of this Club, at 390 Old Colony Bldg., Chicago, is open for the use of members and their friends, and we hope it will be used freely. It is open on week days from 9 a. m. to 5:30 p. m., except on Saturday, until 3 p. m. Books must not be removed from Library, but the Librarian will assist visitors in finding information and will promptly reply to letters from out-of-town members desiring information from the Library. Donations of books and technical publications will be gratefully received.

TRUSTEES OF THE LIBRARY.

OFFICIAL PROCEEDINGS
OF THE
WESTERN RAILWAY CLUB

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Incorporated March, 1897

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Chicago, November 17, 1908

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The regular monthly meeting of the Western Railway Club was held at the Auditorium Hotel on Tuesday evening, November 17, 1908. First vice-president W. E. Sharp in the chair. The meeting was called to order at 8 P. M. Of those present the following registered:

Ackerlind, G. A.
Allison, W. L.
Anderson, C.
Arlein, E. J.
Axtell, G. F.
Baker, F. L.
Beardsley, A. L.
Bement, A.
Benjamin, C. H.
Blatchford, Carter
Bourne, G. L.
Bowen, H. A.
Bowes, C. F.
Breneman, H. N.
Bryant, G. H.
Buckingham, C. L.
Callahan, J. P.
Carlton, L. M.
Carney, J. A.
Carney, J. P.
Chadwick, A. B.
Chisholm, J. E.
Clark, R. B., Jr.
Connors, J. L.
Crane, T. B.
Cutler, O. H.
Day, Christopher
Deems, J. F.
DeMoss, Ira
DeRemer, W. L.

Derby, W. A.
De Voy, J. F.
Dinsmore, C. L.
Dodd, T. L.
Doud, Willard
Down, S. G.
Dunn, S. O.
Dyer, Charles
Endsley, L. E.
Ensign, H. W.
Fitzmorris, James
Flavin, J. T.
Fogg, J. W.
Forsyth, Wm.
Fowler, W. E., Jr.
Fries, W. F.
Gallagher, R. D., Jr.
Gallagher, R. D., Sr.
Garrett, C. M.
Garrett, M. A.
Godfrey, J.
Gould, E. P.
Gordon, F. L.
Goodwin, G. S.
Gale, W. T.
Graves, F. W.
Graves, R. I.
Hahn, F. W.
Haig, M. H.
Hale, W. B.

Hamilton, J. R.
Harsha, B. R.
Harkness, F. L.
Haynes, J. R.
Henderson, T. D.
Hibbard, M. W.
Hill, George
Hopkins, G. H.
Hosceit, W. J.
Hull, G. A.
Humphreys, C. J.
Hunter, P.
Hurlburt, J. H.
Ingalls, F. A.
Jett, E. E.
Johnson, C. H.
Keeler, Sanford
Kelly, J. W.
King, C. H.
La Rue, Henry
Leppla, A. F.
Lewis, J. H.
Lickey, T. G.
Loomis, H. N.
Lovell, C. P.
Lynch, W. J.
McAlpine, A. R.
McClain, H. O.
McCormick, A.
McNaughton, Jas.

Maher, J. T.	Ryder, G. E.	Symons, W. E.
Maltby, G. B.	Sargent, G. H.	Taft, R. C.
Manchester, A. E.	Schmidt, E. C.	Tawse, W. G.
Martin, P. A.	Seley, C. A.	Taylor, J. W.
Midgley, S. W.	Sharp, W. A.	Templeton, W. B.
Miles, G. F.	Shaw, H. P.	Thompson, J. R.
Monroe, M. S.	Sheffer, A. M.	Thompson, J. S.
Moody, W. O.	Slaughter, H. W.	Thomas, C. W.
Moore, A. C.	Smith, H. E.	Thurnauer, G.
Morris, T. R.	Smith, Willard A.	True, C. H.
Neeley, B. J.	Smith, W. R.	Veal, F. K.
Olmstead, C. J.	Squire, F. G.	Walshe, A. F.
Osmer, J. E.	Squire, W. C.	Webb, E. R.
Parsons, Otis	Snead, J. M.	Wickhorst, M. H.
Peck, C. L.	State, R. E.	Willcoxson, W. G.
Peck, P. H.	Stinson, O. M.	Williams, M. E.
Pomeroy, L. R.	Stocks, T. J.	Winn, C. F.
Post, G. A.	Stone, G. A.	Winslow, H. L.
Pownall, W. A.	Stott, A. J.	Wolfe, Charles
Price, R. C.	Stow, H. J.	Woods, E. S.
Robb, J. M.	Studer, Fred.	Young, F. A.
Rowley, S. T.	Sturges, R.	Younglove, J. C.
Russell, M. F.	Sweringen, F. H.	Zealand, T. H.

THE CHAIRMAN: Gentlemen, the first order of business will be the disposing of the minutes of the previous meeting. They have been printed and distributed, and they will stand approved unless there are objections. There being none, they are so ordered.

We will now have the Secretary's reports.

THE SECRETARY: Mr. Chairman, I have the usual membership statement.

NEW MEMBERS.

Name	Occupation	Address	Proposed by
C. G. Bacon, Jr.,	Wheel Engineer,	Carnegie Steel Co.,	
Pittsburgh, Pa.	.....	.....	J. W. Taylor
C. B. Friday,	Salesman,	Carnegie Steel Co., Chicago, Ill.	J. W. Taylor
W. A. Converse,	Sec'y	Dearborn Drug & Chemical Co.,	
Chicago, Ill.	.....	.....	G. R. Carr
G. F. Endicott,	Natl. Dump Car Co.,	Chicago Ill.	H. A. Bowen
J. P. Carney,	Car Foreman,	Mich. Cent. R. R., Chicago, Ill.	C. H. Johnson
W. S. Strong,	National Dump Car Co.,	Terre Haute, Ind.	H. A. Bowen
Edw. F. Gould,	Elect. Engr.	Aurora, Elgin & Chicago	
Ry., Wheaton, Ill.	.....	.....	Jas. Lyman
H. W. Howard,	Davenport Loco. Wks.,	Rock Island, Ill.	Walter Chadwick
F. E. Pilliod,	The Pilliod Co.,	Swanton, Ohio	M. Marea
Henry Pilliod,	The Pilliod Co.,	Chicago, Ill.	M. Marea
C. J. Ewing,	Iowa Central R. R.,	Hammond, Ind.	J. W. Taylor
P. J. Bryant,	J. T. Ryerson & Son,	Chicago, Ill.	L. P. Michael
J. D. Pickard,	Asst. to Engr. Tests,	A. T. & S. F. R. R.,	
Topeka, Kans.	.....	.....	W. L. Allison
Walter Talcott,	Railway Supplies,	Rockford, Ill.	C. A. Seley
A. S. Krohn,	Loco. Engr. L. S. & M. S. Ry.,	Chicago, Ill.	J. T. Flavin
A. C. Moore,	Safety Car Heating & Lighting Co.,	Chicago,	
Ill.	.....	.....	L. R. Pomeroy
H. L. Swearer,	Jas. B. Sipe & Co.,	Chicago, Ill.	T. D. Henderson
W. J. Lynch,	P. M., N. Y. Central Lines,	Chicago, Ill.	G. H. Bryant

RESIGNED.

W. H. Hamilton, R. F. E.—A. T. & S. F. Ry., Topeka, Kans.
 F. C. Green, Consolidated Car Heating Co., New York.
 F. B. Ernst, American Steel Foundries, New York.
 T. C. Eayrs, Westinghouse Elect. & Mfg. Co., Chicago.
 H. E. Tucker, New York Air Brake Co., Chicago.
 G. A. Hagar, Rail Joint Co., New York.
 A. E. Swanson, Chicago.
 J. W. Coneys, Supt. Penna. Lines, Logansport, Ind.
 D. W. Wear, C. I. & S. R. R., Chicago.
 H. C. May, M. M. L. & N. R. R., New Decatur, Ala.
 F. V. Whiting, C. C. A.—L. S. & M. S. Ry., Cleveland, Ohio.

Membership, October, 1908	1,512
New members approved by Board of Directors.....	18
	1,530
Resignations	11
Total membership	1,519

I also have the report of the Auditing Committee, as follows:

CHICAGO, ILL., Nov. 13, 1908.

We, the undersigned, have audited the books of the Secretary and Treasurer, and found same to be correct.

CHAS. H. FRY,
 EDWIN S. WOODS,
 GEO. F. MILLS,
Committee.

THE CHAIRMAN: The next order of business will be the first paper to come before the Club this evening, subject, "Flat Spots on Car Wheels," to be presented by Prof. Charles H. Benjamin, Dean of the School of Engineering of Purdue University. I have now the pleasure of introducing to you Prof. Benjamin.

FLAT SPOTS ON CAR WHEELS.

BY PROF. CHAS. H. BENJAMIN, DEAN OF THE SCHOOLS OF ENGINEERING AND DIRECTOR OF THE ENGINEERING LABORATORY, PURDUE UNIVERSITY, LAFAYETTE, IND.

The damaging effect of flat wheels upon rails has long been acknowledged and measures have been taken to reduce the evil. Thirty years ago, the M. C. B. Association called attention to this matter and adopted a rule limiting the allowable length of flat spots to 2½ inches. The recent agitation in regard to the failures of steel rails in service has led to renewed interest in this subject on the part of railway officials. A proposition to reduce the allowable length of spot to 1¾ inches was the subject of a report made by the Committee on Iron and Steel Structures of the A. R. E. and M. W. Association at their last annual meeting. (See report of Mr. A. J.

long just beginning its contact with the rail. The whole wheel is turning about the point C and will so turn until P reaches R and the blow is struck on the rail. At this latter instant, A will have reached A' and will be moving downward with a velocity represented by the line b c. (The angle b A' c = A C A' = P C R = O.) If the velocity of A' which is practically the same as that of the train, is assumed as v feet per second, then,

$$b c = v \sin \theta = v \frac{C P}{C B} = v \frac{L}{D}$$

If we regard the mass of the wheel and its load as concentrated at A and call the total weight W pounds, the kinetic energy of the mass just before the rail is struck will be:

$$E = \frac{W v^2}{2 g} = \frac{L^2}{D^2} \dots \dots \dots (1)$$

Four facts are shown by this formula. The energy of impact will vary *directly* as:

1. The weight of wheel and its load.
2. The square of the velocity.
3. The square of the length of flat,

and *inversely* as:

4. The square of wheel diameter.

It is impossible to determine the force of the blow as this depends so largely upon the amount that the rail springs and gives under the impact. All we can do is to compare the energy of impact with that of the standard drop test for rails.

According to the specifications approved September 1, 1907, by the American Society for Testing Materials, the standard drop test for steel rails shall be made with a weight of 2,000 pounds falling the distances indicated in the following table. The distance between the rail supports is to be three feet:

Weight of rail in pounds per yard.	Height of drop in feet.	Kinetic energy in foot— pounds.
45 to 55	15	30,000
55 to 65	16	32,000
65 to 75	17	34,000
75 to 85	18	36,000
85 to 100	19	38,000

If we assume:

$$D = 33 \text{ inches}$$

and

$$L = 2.5 \text{ inches,}$$

$$g = 32.2 \text{ feet per second,}$$

and substitute these values in Equation (1), we have,

$$E = \frac{W v^2}{11200} \dots\dots\dots (2)$$

If

$$\begin{aligned} S &= \text{speed of train in miles per hour} \\ &= \frac{15 v}{22} \end{aligned}$$

then

$$E = \frac{W S^2}{5216} \dots\dots\dots (3)$$

The following are some of the values of E for different weights and speeds:

Energy of Impact in Foot-Pounds of a 2.5-Inch Flat Spot on a 33-Inch Wheel.

Weight on wheel in pounds		Speed of train in miles per hour.			
		30	40	50	60
	10000	1725	3060	4790	6900
	15000	2587	4590	7185	10350
	20000	3450	6120	9580	13800

If we compare these figures with those given under rail specifications, we find a factor of safety on a one hundred pound rail varying from 22 at the smallest weight and speed to 2.75 for the largest. If a fifty pound rail is considered, the factor varies from 17.4 to 2.17. Since the impact varies as the square of the length of spot, reducing this length from 2.5 to 1.75 inches would diminish the impact about one-half and double the above factors of safety.

In the foregoing brief mathematical treatment, some factors have been neglected such as the impact due to the falling of the center of the wheel before the contact of the flat spot with the rail, the fact that the wheel is a compound pendulum and that the mass can not be regarded as concentrated at its center of gravity, and the possible bounding of the wheel from one corner of the flat to the other without touching the rail at high speeds. It is not probable that any of these will have much effect on the values just given. It is, however, true that the flat spot on a wheel

is usually not straight, but is convex or perhaps slightly rounded at the ends. For these reasons, it is extremely desirable from both a scientific and business point of view to determine experimentally the exact effect of the blow delivered by a flat wheel on the rail. It is hardly practicable to do this with a car on a straight track because of the influence of the driving wheels of the engine and the number of wheels which would pass over a given point. To be satisfactory, experiments should be confined to one wheel whose condition is determined beforehand.

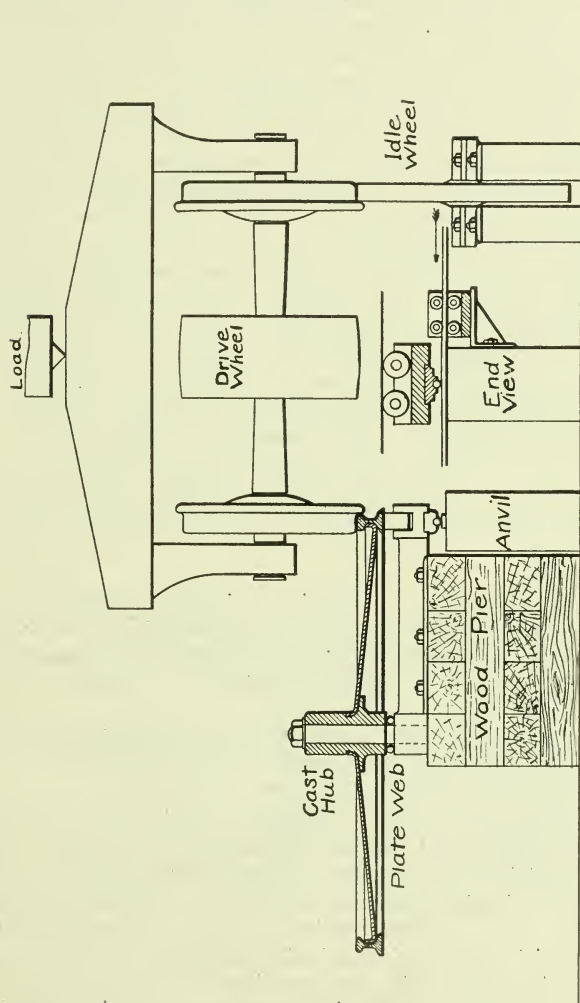


Figure 2

The apparatus shown in Fig. 2 will permit of continuous opera-

tion of one wheel upon one section of rail indefinitely and permit at the same time of measurement of the effects of the blows. The truck is so supported that one wheel turns freely upon an idle pulley while the other wheel on the same axle rests on a section of steel rail and in turning drives the latter by friction. The section of rail is bent to a circle lying in a horizontal plane and is firmly riveted or bolted to a supporting web, which in turn is fastened to a central hub of cast-iron or steel. This hub turns freely on a vertical mandrel and is supported by a thrust bearing underneath. The rail and its attachments thus turn in a horizontal plane under the rotating car wheel. The portion of the rail immediately under the wheel is supported by friction rollers, which turn freely in a steel box or yoke. This latter forms a portion of the main casting supporting the hub of the rail and this casting is bolted to a wooden pier so as to have a certain amount of elasticity. On the lower side of this casting and directly beneath the point of contact between wheel and rail is a hardened steel hammer or ball resting on a strip of soft metal. The soft metal is supported on a heavy anvil of cast-iron and is fed slowly underneath the hammer by friction rollers. The truck being loaded with the desired amount of pig iron or other material, the wheels and their axles are rotated by means of a variable speed motor, and the energy of the blow delivered by a flat spot on the wheel is measured by the indentation of the strip of soft metal underneath the hammer. The amount of energy due to any given indentation can be readily measured by producing a similar indentation under a drop press. The curving of the rail in a horizontal direction is not sufficient to interfere with the action of the wheel and the energy of the blow is transmitted directly to the soft metal.

It may be noted that it is possible with this machine to drive the wheels at any desired speed corresponding to any desired number of miles per hour and that any length or shape of flat spot can be readily tested. It is also possible to change the load as desired.

The same apparatus can be used for determining the impact due to flat spots on locomotive drivers or the effect of the various types of counterbalancing on the rail.

Such an apparatus can be arranged in a pit so as to bring the rail tested at grade and make it possible to run any truck or engine into position for testing without disturbing the mechanism of the truck itself, except as it may be necessary to attach a driving wheel. The results derived from the experiments can be combined with the mathematical reasoning in such a way as to make a working formula for practical use.

A simple modification of this apparatus would make it possible to test a span of rail between two supports the same distance

apart as are the ties, and to measure the deflection produced by impact. It would also be possible to run a rail for any desired length of time under severe conditions and determine its wear and depreciation under these circumstances.

In view of the fact that there is at the present time some discrepancy between the rules for flat wheels and the speed and weight of trains, and to the further fact that no one seems to know exactly how much damage is done by flat wheels, it would seem very desirable to make an accurate experimental determination of the forces involved. The figures obtained from such experiments would also have a bearing upon the design of steel structures for railway use. The prominent part already taken by railway men in the experimental determination of the strength of railway machinery and structures would lead one to believe that this important investigation will not be much longer delayed.

I will say in closing that my interest in this matter is a scientific one, but at the same time I feel that there is something more involved than the mere question of the relative cost of wheels and rails. What appeals to many railroad men is the fact that on one side we wish to reduce the expense of renewing rails, and on the other side we wish to reduce the expense of renewing cars wheels, and that you may offset one against the other. There still remains the fact that a broken rail, aside from the damage to the rail itself, is liable to be productive of serious injury to subsequent trains and cause a loss of property, and even loss of life, and that it would seem to be desirable to investigate all the different factors which may cause injury to the rail, determine whether or not they are really injurious and have the thing settled once for all. I thank you, Gentlemen. (Applause.)

THE CHAIRMAN: Gentlemen, I feel that we are very much indebted to Professor Benjamin for this very interesting and instructive paper, and I hope that you may enter into a full discussion of it, but before we take up the discussion of the paper I am informed that Mr. J. F. Deems, President of the New York Railroad Club, is in the room. I will appoint an ex-President of the Western Railway Club, Mr. Seeley, to escort Mr. Deems to the desk that he may have a chair with the president to-night. It gives me great pleasure to present to you the president of the New York Railway Club, and also a pioneer member of the Western Railway Club, Mr. Deems. We will now proceed with the discussion of Professor Benjamin's paper. I hope you will not wait to be called upon. The Secretary has a letter of discussion on this paper that it might be well to read at the present time.

The Secretary read the following letter:

H. H. Vaughan (Asst. to Vice-President Canadian Pacific Ry).

The statement made in Professor Benjamin's paper would indicate that the existence of flat spots on car wheels is a very serious

matter, and one that is largely responsible for the breakage of rails in various parts of the country, and were the formula developed by Professor Hancock correct, this would undoubtedly be the case; flat spots would be recognized as a most dangerous and expensive defect, and without doubt action would have to be taken to change the M. C. B. limit to a far smaller one in order to remedy this state of affairs.

When Professor Hancock's formula appeared, however, I was struck, in reading it, with the fact that the assumptions were entirely unjustified. It is assumed that the mass of the entire weight supported by the wheel is concentrated at the centre of its axle: it is assumed that when the wheel is turning around, that the edge of the flat spot remains in contact with the rail. These two assumptions of themselves are entirely unjustified. A comparatively small amount of the weight of the car is carried below the springs, and can in no way be considered as concentrated at the centre of the axle, and at all speeds above a certain limit, it would be obvious that the assumption that one edge of the flat spot remained in contact with the rail was entirely incorrect. I therefore investigated this question on an entirely different basis, in which I was subsequently assisted by Mr. Spillsbury of our Bridge Department whose mathematical analysis was so far superior to that I had developed, that we prepared a joint article for the *American Engineer and Railway Journal*, in which the assumptions I had considered as reasonable were outlined, and the results obtained from these assumptions through Mr. Spillsbury's calculations are given.

By the courtesy of Mr. Wright, Editor of the *American Engineer and Railway Journal*, I am enabled to transmit to you this article, which I consider is most important in view of the present paper by so high an authority as Professor Benjamin, accepting the analysis of Prof. Hancock, and I am sure you will be interested in the results obtained, and I feel that as practical men you will agree that the results obtained by my analysis, viz., that the blow from a flat spot approximating that blow at 1,600 pounds weight falling through one foot, and that the size of this blow is independent of the speed of the train, agrees very closely with your practical experience.

While, on a passenger car in which we may have a flat spot, the noise, of course, becomes more frequent as the speed increases, the sound of the blow does not become appreciably louder after twenty miles an hour.

The article referred to is the first portion and does not include the mathematical analysis which will appear in the December number of the *American Engineer*, and which is too long to go in here. It is as follows:

EFFECT OF FLAT WHEELS ON RAILS.

In the May number of *The American Engineer*, page 188, an article appeared by Mr. E. L. Hancock, discussing the effect of a flat

wheel on a rail, in which it was calculated that the blow delivered by the wheel was exceedingly serious in its amount and increased very considerably with the speed. This calculation was based on two assumptions, namely, that the weight carried by the wheel could be considered as a weight concentrated at the center of the axle, and that the leading edge of the flat spot remained in contact with the rail, while this weight described a circle around it. Neither of these assumptions is justifiable. In the first place, allowing that the wheels together with such other parts of a car or tender as are carried below the springs may be considered as concentrated at the axle, the body of the car is spring supported and cannot be considered as acting in the manner assumed, and in the second place the edge of a flat spot on a wheel with any given weight concentrated at its center would not remain in contact with the rail after a certain critical speed is reached.

A more reasonable method of considering this problem is to assume that the weight supported by each wheel below the springs is concentrated at the center of the axle, and that this weight is pressed down by a force equal to the weight supported by each wheel above the springs and these quantities may be roughly taken at 1,600 lbs. and 14,400 lbs., respectively, giving a total weight per wheel of 16,000 lbs., or of 128,000 lbs. per car.

On this basis the problem has been thoroughly worked out by Mr. L. S. Spillsbury, of the office of the Engineer of Bridges, Canadian Pacific Railway, whose mathematical discussion is given below.

The results of this thorough and ingenious analysis are entirely different from those previously obtained and may be summarized as follows:

The striking velocity of the trailing edge of the flat spot on the rail increases proportionately to the speed up to a critical speed at which the leading edge leaves the rail. This critical speed under the assumption as to weights, etc., specified above, is about 21 feet per second, or 14.5 miles per hour for a 33-inch wheel.

After this critical speed is reached, there is a small range of higher speeds during which the leading edge of the flat spot after leaving the rail hits it again almost instantly, then one slightly higher speed at which the flat surface strikes the rail, after which the leading edge of the flat spot, after leaving the rail, does not again touch it, and the wheel leaves the rail until the trailing edge of the flat spot strikes it; this last condition continues indefinitely as the speed increases.

After this last condition is reached the velocity with which the trailing edge of the flat spot strikes the rail is constant. It varies, for small flats, directly as the length of the flat, directly as the square root of the ratio between the total weight supported by the wheel to the weight below the springs and inversely as the square root of the radius of the wheel. For a 33-inch wheel supporting a total

weight equal to ten times the weight below the springs, this constant and maximum striking velocity is as follows:

For 3 " flat spot.....	3.8 feet per second.
For 4½" flat spot.....	5.7 feet per second.
For 6 " flat spot.....	7.6 feet per second.

The blow delivered by the wheel at these velocities corresponds to that delivered by a weight of 1,600 pounds falling through the following distances:

For 3 " flat spot.....	0.22 feet.
For 4½" flat spot.....	0.50 feet.
For 6 " flat spot.....	0.89 feet.

The results of these calculations are in close accordance with practical experience, and the curious fact that the blow delivered by a flat spot is constant after a certain speed is reached corresponds with the sound given at varying speeds.

The blow delivered on a rail by a flat spot while severe is not to be compared with that of a 2,000-pound weight falling through several feet, and is well within the capacity of any sound rail to withstand.

The regulations of the Master Car Builders' Association give ample protection against excessive blows and do not allow wheels to run in a condition that may prove injurious to the rail.

PROF. C. H. BENJAMIN: Mr. Chairman, allow me to say that I knew nothing of Mr. Vaughan's discussion before it was read by the Secretary, since it came in too late for transmission. I am sorry that the article alluded to by Mr. Vaughan did not appear before, that I might have had the benefit of it before presenting this paper. As I have not had an opportunity to read the article, it will be impossible for me to discuss it at this time.

I can only say that at present I fail to see the distinction between regarding the weight as concentrated at the center of the wheels and regarding it as a force pressing down upon that center. It seems to me that the action of the springs would be difficult to explain mathematically and that the action of the spring as the car sways might increase the very effect it is expected to reduce. I believe that at times considerably more than one-eighth of the car load is concentrated upon one wheel—how much more, it is impossible to say.

With regard to the leading edge of the flat spot leaving the rail, I may say that this is alluded to on page 4 of my paper, and that I have always recognized the existence of a critical speed beyond which the flat spot would not drop into absolute contact with the rail. Professor Hancock did not investigate this in his study of the subject, and I had called attention to it in a discussion of his paper.

Whether the speeds given by Mr. Vaughan and Mr. Spillsbury are correct, I am, of course, unable to say, having never investigated the subject. It is probable that even after the critical speed is reached,

there will continue to be an increase in the energy of the blow. In view of the differences of opinion among engineers and mathematicians as to the mathematical treatment of this subject, and the large number of elements which enter into the problem, not yielding to mathematical treatment, perhaps I may be allowed to say that I think experimental investigation is necessary. Judging from my past experience in experimental verification of mathematical discussions, I should be entirely unwilling to accept any mathematical treatment without subsequent practical demonstration.

PROF. E. C. SCHMIDT (University of Illinois): Mr. Chairman, it seems to me that Professor Benjamin has presented an interesting and suggestive paper, and he has suggested a very interesting experimental device. Its timeliness is surely open to no question. Anything which at present tends to introduce certainty into the problems concerning the strength of wheels and rails, demands most serious consideration, and it seems to me that some such experimental attack upon these problems as is suggested in Professor Benjamin's paper ought soon to be developed and put into effect. Most of us in thinking of flat spots upon a wheel are in the habit of thinking about the effects upon the wheel itself, rather than upon the rail. Such a device as is presented in this paper would permit the investigation of the stresses in the wheel, as well as of the stresses in the rail.

On the last page of the paper, page 6, in next to the last paragraph, Dean Benjamin has suggested the feasibility of using such a machine for determining rail wear, and has emphasized that application in his remarks before us this evening. It occurs to me that possibly a moving rail, such as we have in this device, would make the determination of rail wear extremely difficult. It seems to me that the practical duplication in this apparatus of conditions, under which the rail is put in practice, would be well-nigh impossible. For such purposes I believe that a fixed rail, rather than a moving rail, would be more successful. Such a testing machine has been developed by the Pennsylvania Steel Company, in which they have a circular section of rail supported rigidly, or as a rail ordinarily is supported, the rail itself being stationary and the wheels moving. This testing device was exhibited by them at the recent Convention of the American Street Railway Association. I have wondered as I have read the paper, and as I have listened to Professor Benjamin, whether this, or any similar machine, had been constructed, and whether there were any results. I am sure that if there have been results, even though they were very incomplete and tentative, we should all be glad to hear about them.

THE SECRETARY: Mr. Chairman, in the distribution of this paper I sent copies to Mr. A. J. Himes, Assistant Chief Engineer of the Nickel Plate Road. Mr. Himes is chairman of the American Railway Engineering and Maintenance of Way Association Committee

on this subject, and if he, or any of the members of his committee, are present, I would like to ask that the privileges of the floor be extended to them.

THE CHAIRMAN: Mr. Himes, will you please come forward so the stenographer can get your remarks?

MR. A. J. HIMES (A. C. E., N. Y. C. & St. L. R. R.): As Dean Benjamin has said, the present M. C. B. limit was adopted in 1878. In 1905 the Northwest Railway Club, and the Western Railway Club, recommended a reduction in the limit. In 1906 the Canadian Railway Club, the Central Railway Club, the Pittsburg Railway Club, and the Car Foremen's Club, recommended a reduction in the limit. For some time past the American Railway Engineering and Maintenance of Way Association has been busily engaged in seeking out the various defects and weaknesses of the roadbed and in striving to remedy and strengthen those weak places. Among many possible causes of deterioration the possible damage by flat spots was considered important, and for that reason a committee was appointed to study the subject and report thereon. Because of the great interest taken in the matter by the Master Car Builders Association and of the important effect that any change in the limit might have upon the interchange of cars and renewal of wheels, it was deemed proper and advisable to invite the co-operation of this Association, and with that end in view it was arranged that this Committee should confer with the Arbitration Committee of the Master Car Builders Association, and later with the Committee on Car Wheels. We had two meetings with the Arbitration Committee and one meeting with the Car Wheel Committee. It was pointed out at these meetings that somewhere between the point of unquestioned safety which might be assumed for a 60,000 pound car, and a $2\frac{1}{2}$ -inch spot, and a point which was positively dangerous which might be assumed for, we will say, a 120,000 pound car, a 3-inch flat spot, there must be some point where the $2\frac{1}{2}$ -inch flat spot ceases to be sufficient as a limit. To elaborate on that a little, I might say that in Pittsburg there are now in use cars having a capacity of 200,000 pounds, that is, twice our 100,000 pound capacity cars. I would say also that the development of locomotives has reached the limit of the capacity of our tracks. They cannot go any further until there is some radical change in our roadbed. The present trend of development in transportation is to increase the axle loads throughout the whole train until they approximate that of the locomotive axle. Now I think all railway men will concede that when we load every axle in the train as heavily as the locomotive axles, then a $2\frac{1}{2}$ -inch spot probably would not be permissible.

The request was made of these committees that they unite with us in a recommendation that certain measurements be made, such as have been described this evening, to determine at what point this $2\frac{1}{2}$ -inch limit ceases to be sufficient, and if through the result of

such experiments it might be found that the $2\frac{1}{2}$ -inch limit was excessive for a 100,000 pound car, then eventually it probably would lead to a reduction in the limit. It probably will interest you all to state briefly the opinions which have been expressed by the representatives of the Master Car Builders Association, and the comments which we would make on those opinions. It has been stated—it has been brought out in the discussions—it has not been formulated in this language, but I have endeavored to express the ideas which I have listened to, and if in any respect I am incorrect, I would be very glad to have some of the members of that Association correct me:

First. Although the present limit of $2\frac{1}{2}$ -inches was adopted in 1878 when the maximum car capacity was 40,000 pounds, and although that capacity has increased to 100,000 pounds, the cars and rails have been increased in strength and durability so that relatively the $2\frac{1}{2}$ -inch limit remains entirely safe.

Second. The corners of a $2\frac{1}{2}$ -inch flat spot soon become rounded by wear, and the impact therefrom is not nearly so great as might be considered theoretically.

Third. The elasticity of springs and roadbed serve to greatly diminish the force of the blow.

Fourth. A reduction in the limit would involve an enormous cost in the renewal of wheels, and consequent delay to traffic.

Fifth. At the last meeting of the Arbitration Committee it was asserted by Mr. Demarest, of the Pennsylvania, speaking for the committee, that the question was not one of economy at all, but one of safety.

Sixth. It is believed that the present limit is entirely safe, and that belief is based on experience and general knowledge. The most pertinent and specific statement in support of this statement was offered by Mr. Manchester, of the C. M. & St. P. Ry., who stated that his road has 55 miles of 60-pound rail, over which there is a heavy traffic in 100,000 pound cars with no damage to the rails. He then qualifies this statement by saying that the track is ballasted with sand, that indicating that there was greater elasticity under this track than there would be under a rock ballast, or some other construction.

Seventh. An investigation of the injuries due to flat spots should be recommended only when it has been conclusively proven that great danger exists.

The comments which we would make on those points are as follows:

First. With reference to the sufficiency of the $2\frac{1}{2}$ -inch flat spot **in consideration** of the increased strength of wheels and rails, I have already stated what our comment would be; the limit of the capacity of the track has been reached by locomotives. The next development in the matter of transportation is the use of wheel loads

throughout the train approximating the loads on the locomotive driving wheels. If to these loads be added the effect of flat wheels, a serious attendant damage cannot be disputed. Now Professor Benjamin has said that the use of mathematics only points the way and tends to assist our judgment. We do not need to go to mathematics. It would serve the purpose better if we rode a 100,000 pound car, having a wheel with a $2\frac{1}{2}$ -inch flat spot. We all know that there is an impact on the rail. We do not know the magnitude of that impact, and that is what we would like to find out.

Second. With reference to the corners of the $2\frac{1}{2}$ -inch flat spot being rapidly worn away we would say that a great many car wheels are eccentric and the vertical oscillation of the load due to elliptical wheels is very serious, and in many cases may readily approximate the effect of the theoretical flat spot. We have gathered some statements from various railroads throughout the country with reference to the breakage of rails by flat spots, and while those statements have been made generally with regard to locomotives and loads in excess of what we get at the present time, it was shown that flat spots had broken rails and that elliptical wheels had broken rails, so that there is a point, although we may concede for the present that it is beyond our 100,000 pound cars, where these defective wheels are dangerous.

The third statement was with regard to the elasticity of the car and the roadbed, and in answer to that we would say that in the winter time many roadbeds are frozen solid, and a great many roads are ballasted with rock, and the tracks are so very solid that any elasticity must be somewhat imaginary.

The fourth point is in regard to the cost of a reduction in the limit. It would involve changing out a larger number of wheels and consequently a greater delay to traffic. The offset to that is the cost of renewing the rails and maintaining the tracks. But though we may not break the rails, this constant pounding causes the tracks to deteriorate more rapidly, and thereby occasions an increased expense for maintenance, the cost of which, like the cost of renewing wheels, is very hard to estimate. The condition that is most to be feared is a disastrous accident, and such an accident might result in a cost much greater than the changing out of a very large number of wheels.

Fifth. It was asserted that the question of economy should not enter into the discussion at all. It should be one of safety. To this we would say there is no question but that the elimination of danger is far more important than the question of economy.

Sixth. It is stated as the belief of the representatives of the Master Car Builders' Association that the $2\frac{1}{2}$ -inch flat spot is entirely safe. The violent blow occasioned by a flat wheel under a heavy car is a matter of common observation, and no one can dispute it. No one has yet measured the force of that blow, and consequently no one can say at present just what its effect is, but all manufactur-

ers and users of steel know full well that such severe treatment is likely to be followed by serious failures. Even though a flat wheel may not break a rail it punishes it. That question has been argued pro and con for years among makers and users of steel, and among those men it is an accepted fact that repeated and incessant pounding is injurious and causes the rail eventually to break, when under normal treatment no rupture would occur.

With reference to the last statement that an investigation of the injuries due to flat spots should be recommended only when it has been conclusively proven that great danger exists, I am reminded of an incident which occurred in my experience in the construction of a very long and important viaduct. There was a strike on this work of the bridge erectors. Dynamite was used and some of the men were seriously injured. The police were appealed to for protection. Their reply substantially was this: "Wait until somebody is killed, and then we will investigate." It appears to us that it would be far more creditable to those who are responsible for the maintenance of a track to investigate this matter thoroughly and find out what there is in it before the occurrence of some disastrous railroad wreck which would result in a most exhaustive investigation by Government officials. I thank you, gentlemen. (Applause.)

THE CHAIRMAN: Gentlemen, we have had a very good presentation of this subject from the Chairman of the Committee of the American Railway Engineering and Maintenance of Way Association. We would like to have it discussed on both sides.

MR. A. E. MANCHESTER (C., M. & St. P. Ry.): Mr. Chairman, the Western Railway Club is supposed to be made up of all branches of railroading, and I do not feel that the Master Mechanics Association or the Master Car Builders' Association have any special privileges or rights here that are not accorded to all the others, and I certainly hope that the Maintenance of Way people will express themselves freely in connection with the subject.

The question of flat spots and their effect upon the rail has been the subject of an investigation by the Maintenance of Way Association and they have received a good many answers to their inquiries from the Master Mechanics and Master Car Builders, and from the Maintenance of Way people, and after listening to and reviewing those reports it was not apparent to me, at least, that there had been anything brought out to indicate that there was any danger, at least in connection with the practices as they exist, of allowing flat wheels to operate up to $2\frac{1}{2}$ inches. I do not feel that the Master Car Builders' Association to-day is made up of people who are going around with a track gauge to try to explain all the derailments that occur, or that the Maintenance of Way people are carrying a wheel gauge around with them to determine the other side of the case. I feel that we should take hold of this subject and consider it along the line of the best interests of the railroads; and if there was any

information presented to show that the $2\frac{1}{2}$ spot had reached anything anywhere, within the zone of a dangerous proposition, I do not believe there would be anybody more willing than the car people to take hold of the subject and try to correct it, even let the expense be what it would. It seems to me that the paper as read by the Secretary brought out some features of the case that are worthy of very careful thought. I cannot, in my own mind, reconcile the force of the blow as presented by a spot less than $2\frac{1}{2}$ inches. If it were within the limits, as stated in the paper, it would seem to me that the flat spot would continue to grow and continue to be larger and that in operation it would grow longer, while those who have watched the effects of flat spots on wheels know that the reverse is the case; that the flat spot gradually grows less and in many cases almost disappear in time.

I have had some experience with wheels that were reported or purported to have broken rails. I remember a case in which several broken rails were found following a certain engine. A careful examination was made of the engine but they failed to find any defects in the wheels. Experts were sent to ride the engine and could not discover any defects from the riding of the engine. The breakage of rails still seemed to follow this engine, and a gauge was finally made that tested the periphery of the wheel from the center, and it was found to be considerably eccentric and the removal of the engine from service stopped the breakage of the rails. Since that time whenever a question come up that points to the breakage of rails a vigorous search is immediately instituted for wheels that show these same conditions. I believe that this is a source of danger, but I have never seen anything that has led me to believe that the $2\frac{1}{2}$ -inch flat spot under a 33-inch wheel had broken any rails, and I have not been able to learn of anybody who has discovered any such flat spots breaking rails.

MR. C. A. SEELEY (C., R. I. & P. Ry.): Mr. Chairman, in regard to this matter of flat spots, it appears to me that the consideration has been perhaps a little too much toward the theoretical, and I am reminded of an instance that occurred recently at a draft gear test which I witnessed. Incident to these tests was some rivet shearing, and a railroad man who was present and noticed the shearing of the rivet said: "If that test is right, every car that I have is on the repair track at this moment." The facts of the case were that the conditions were not alike in the cars and in the test apparatus, so that the parallel could not be drawn, and it appears to me that the statement that the flat spot soon disappears, that it is rounded and disappears soon after it is made, very materially changes the argument. The statement by the former speaker that repeated hammering and stress on rails will injure them could be met by the fact this this hammering is not done at one spot on the rail. It is

a good many inches around the periphery of a wheel and it is seldom that those shocks would be repeated at the same point.

MR. L. R. POMEROY (Safety Car Heating & Lighting Co.): There is a rather interesting point in connection with flat spots that was borne out by some experiments made on an eastern railway a number of years ago. It was an engine fitted with so-called polygonal driving wheels on which the flat spots were five inches long all around the circumference of the wheel. It was an engine built by the old Mason works and tried on a New England Road. A set of these wheels was also applied to a locomotive on one of the elevated roads and after six months' wear you could not distinguish these spots; the whole wheel was practically cylindrical.

MR. W. A. SMITH (Railway and Engineering Review): I should like to indorse Prof. Benjamin's views regarding the desirability of physical tests in all such cases. Not very long ago in the case of a very well known accident on one of the eastern roads, happening on a curve where the question of pressure on the outside rail of the curve was involved, two eminent engineers were called in, who, on the basis of certain assumptions, proved certain things. The Chief Engineer of the road, thinking the thing over one night, took another assumption, which apparently was as plausible as that which these engineers had taken, and following the same course of reasoning arrived at very different results. A great deal in all these calculations depends upon the assumptions that we have to start with. We all remember that in the case of the recent great disaster on the Quebec bridge the failure of a certain member was proven to be the cause of the disaster. The mathematical calculations on which the strength of that member was based were correct, and yet I believe it is the consensus of opinion among the best engineers of to-day, which opinion was drawn out by that failure, that it is impossible to determine by mathematical calculation the strength of so large a member which had never been built before, and that there should be some means provided by the Government, if necessary, for testing these large members. The cross section of the material which failed was all right, based upon all previous calculations, and yet the principle when put into practice was entirely inadequate. I think that in instances of this kind, where it is possible to demonstrate a thing by physical test, we should cast aside all assumptions and get down to the actual facts, and it rather seems to me that Professor Benjamin has shown that it is possible to demonstrate something in this matter.

MR. WM. FORSYTH (Railroad Age Gazette): Mr. Chairman, Professor Benjamin finds some satisfaction in thinking that if the theoretical treatment of the subject will not bring desired results, practical tests will. I have always been a strong advocate of laboratory methods of testing railway materials and appliances, but when it comes to tests by impact I feel rather doubtful about it, and I

would like to insist on a correct interpretation of results in order that we may not deceive ourselves by the artificial conditions which have surrounded the tests. Mr. Seeley gave a good illustration in the drop test of friction draft gear, where the rivets were sheared when supported by a rigid anvil, and yet in the train they would do nothing of the kind on account of the cushioning of the car construction, and for this reason I think the testing machine which Professor Benjamin has recommended should be discussed, and I would refer to it. The very condition which Mr. Seeley referred to in the above test is found in this machine and the reason why the rivets sheared so easily there is found in this machine having a very rigid anvil, and for that reason the results obtained by impact on this rigid anvil would not be comparable with those obtained by a flat spot striking the rail of a track made up of wooden ties and ballast with earth substructure. Although that would be measuring the energy of impact I do not see how we could measure by this machine the effect of the blow, and therefore I feel doubtful whether very useful results would be obtained from this machine. I suppose Professor Benjamin will accept a friendly criticism of it, and probably recognize that some modification should be made in that respect. The paper says that it is impossible to determine the force of the blow, as it depends so largely upon the amount that the rail springs and gives under the impact. All we can do is to compare the energy of the impact with that of the standard drop test of rails. Now what would be the use of comparing the energy of impact obtained in this way with the drop test of rails, which is a very indefinite thing? The drop test for rails is not a measure of strength. It is not a measure of any resistance in the rail. It may bend the rail five inches or ten inches; it produces a stress beyond the elastic limit and below the ultimate strength: it simply is a crude method of determining whether the rail is brittle or not, and therefore I think it would be useless to go to the trouble of making a machine which would simply give us a reference to the drop test for rails.

MR. W. C. SQUIRE: I have listened to Mr. Forsyth's remarks with much interest because he voices a thought I had with reference to this particular suggestion as to test of rails described in the paper presented by Mr. Benjamin. I question whether there is sufficient equality or continuity of density throughout any one length of wire by means of which you can secure an accurate comparison between any two blows, whether they are consecutive or not. Following this particular circular rail in its path around the machine, there will be found that at no time exactly the same spot will be struck by the flat spot on the wheel; therefore, this so-called hammer blow will occur at various points along the rail itself, exactly as it does in actual practice.

I wish to give the following reasoning which may possibly explain why the flat spot rounds off. The flat spot represents the chord of

an arc; consequently when the wheel with the flat reaches the point of instantaneous rotation, which is in this case the leading edge of the flat, the wheel on the other end of the same axle will tend to revolve at a greater speed than that represented by the distance across the flat, as represented by the chord of that particular arc; therefore, there is a tendency for the wheel with the flat spot to slip on the instantaneous center of rotation of the flat wheel, which tends to tend off the edge of the flat. The final result is to bring both wheels to the same shape so that they eventually revolve in unison without distortion or further twisting action on the axle.

Mr. Pomeroy's description of the driving wheel that was made as a polygon tends to still further explain the rounding of the flat, in that the weight concentrated on a very thin sharp section, as the edge of a flat really is, will have a tendency to round it out, due to a flowing of the metal. It can also be readily seen that if the faces of the two polygons were not exactly parallel or in line with one another, one would have a tendency to roll, while the opposite one would have a tendency to slide, but being mounted on a stiff, non-yielding axle the periphery of the wheels will necessarily equalize as to shape and gradually assume an approximately circular form.

Mr. Manchester has just raised the question of driving wheels becoming elliptical. I carried on some experiments along that line some years ago and was very greatly surprised to find how much out of round a set of driving wheels could become with relatively small mileage. After six weeks' time an engine raking 150 miles per day will actually run out of its mechanical center. When circular diagrams were plotted from the radii of those wheels in reference to the mechanical center, using each one-hundredth of an inch as a basis of measurement, the periphery of the wheels measured out of a true circle, and multiplying each hundredth by ten, it made the most beautiful cam that you ever saw. This method of plotting exaggerates all the flat spots, and they are numerous. It is enough to say that I found much food for thought and for further investigation as a result of these experiments.

Professor Benjamin's machine will not, I believe, give any definite results so far as the rail is concerned, unless the rail is supported at points 18" to 36" apart, or at whatever distance it is desired to make the comparison. The anvil being placed directly under the point where the blow occurs will only give what the formula demonstrates, and that is, the value of a blow delivered to the anvil or to the sub-structure on which the wheel is rolling.

MR. J. F. DEVoy (C., M. & St. P. Ry.): I would like to ask, as a matter of comparison, how much that wheel was out of round or elliptical? You say it did not have any effect on the rail?

MR. W. C. SQUIRE: I did not say such a wheel would not have any effect on the rail. I pointed out that the wheel readily became, and actually was, out of round. In some instances I found wheels

to be $\frac{1}{8}$ " to $\frac{3}{16}$ " relatively out of round; in other words, there is that much difference between the several sums of diametral radii of the wheel. It proves, to my satisfaction, that the wheels tended to find and revolve about their true centers, which is the center of gravity for each and every wheel so measured.

MR. J. F. DeVoy: I don't know but that I have been slow in expressing my opinion, but I know that if there had been any broken rails on our road I should immediately go out and take a tram and tram the driving wheel tires under all my engines, if necessary. I do not wish to dispute anyone, but I do know after witnessing tests of this kind no less than half a dozen times within three months, in one of the largest steel plants in this country, that a test made under the conditions as explained in this paper is an absolute impossibility. In other words, to place one wheel under another it will be absolutely impossible to keep the bearings cool. The first time I was called in links were suspended at one end of the beam in the shape of trucks and weights on the other end. I contended immediately that due to the absence of springs the conditions were not perfect, and if springs were put in we would obtain better results and the bearings would run true. By adding considerable expense this was done and I found out I was just as bad off as I was when I started. I immediately took or recommended taking away from the farther end of the lever and placing it directly over the box. I found that I had made a mistake there in putting the springs over the boxes and putting loads on them, that these conditions did not prevail in service. The springs have been taken out now and placed exactly as they are on the car, revolving exactly as explained in this paper, and with absolutely no result, and I know just as well as I want to know, as far as I am concerned, that a test conducted on an apparatus built up along the lines, as recommended, will not give results equal or similar to actual railway conditions. I also believe that there are much greater blows struck on a perfectly straight track by moving trains, and that the 13,800 pounds quoted here is not anywhere near as high as the blow struck wheel flanges, which, if my memory serves me correctly, is from 38,000 pounds upward.

THE CHAIRMAN: I do not want to close the discussion on this paper, but Prof. Benjamin advises us that he must leave at ten o'clock, and as his time is limited I would suggest if any of the members have anything further to say that they write the Secretary, and I will call upon Prof. Benjamin to close the paper.

PROF. BENJAMIN: So far as criticisms of this apparatus is concerned I will say that that was just the purpose of reading the paper; to get the opinion of practical railroad men on the apparatus and suggestions for its improvement. I did not intend at the bottom of page 2, of article 4, to say that it was impossible to determine the force of the blow experimentally. I meant that it was impossible to determine it by mathematics, and therefore I made the com-

parison between the mathematical figures and the drop tests of rails.

As regards the rigidity of the anvil I will say that it is stated in the paper that the arrangements shown is to determine the effect of various lengths of flat spots and of various speeds and weights. I agree entirely with those gentlemen who have spoken that, in determining the effect of the impact on the rail it will be necessary to support the rail beneath the blow in the usual manner; that is, on the ties and with the usual ballasts; I see no difficulty in doing that and in determining the effect by measuring the deflections of the rail and then, if you will, testing it under the drop, even carrying the test so far as to break the rail.

The criticism of Professor Schmidt with regard to determining the effect of continuous blows on the rail was well made. There has been an apparatus devised for testing rail wear which perhaps could be used for this particular determination. This consists of two wheels mounted on a long axle, rather longer than a standard gauge, and running one after another around a circular track, so that the track is stationary and the wheels travel around it driven by gearing at the center, or some such contrivance. In that way it might be possible to determine the effect on a stationary rail of continuous blows.

Concerning the positions taken by the various members of the Maintenance of Way Association and the Master Car Builders, of course, I have nothing to say. It seems to me that the position is something like this; the Maintenance of Way people says: "Your flat spots are breaking my rails," and the Master Car Builder says: "You can't prove it." Now, I am somewhat in the position that Mark Twain was at dinner one time when there was a discussion as to the future state, and he was asked to make some remarks on heaven and hell, when he declined on the plea that he had friends in both places. (Laughter.) So I want to keep nicely free of that discussion, and I simply want to say to you gentlemen that if any experiments are made as to the effect of flat spots on wheels upon rails, I hope I shall have the opportunity to make them, and judging from past experience Purdue University will be entirely capable of handling the problem so far as it can be handled in that way.

THE CHAIRMAN: We will now declare the discussion closed on this subject and proceed with the further order of the evening, and in presenting the next speaker, Mr. George A. Post, President of the Standard Coupler Company, and also the Railway Business Association, who will speak on "Railroads and the Business Revival," I do not know of any words that I could use that would better fit the occasion than to read the lower portion of the circular announcing this meeting where it says: "Mr. Post, in his address as temporary chairman of the Railway Business Association at its organization in New York recently, stated that 'when railroads are prosperous, times are good everywhere * * * those who depend upon railroads

for subsistence, directly or indirectly, must be loyal to their means of support.'” * * * I know that we shall all be glad to listen to Mr. Post, whom I now have the pleasure of introducing.

MR. GEO. A. POST: Mr. President, and Gentlemen of the Western Railway Club: You have had such an interesting discussion upon a very important subject that I feel really that I ought to lean to the side of mercy and not detain you for any great length of time, but the subject that interests all of us as much perhaps as flat spots on wheels is whether there shall be any use for the wheels anyhow. I don't know much about wheels, but I do know that there have been some great big flat spots on the wheels of commerce lately that have jarred the loads off of the cars and as they have gone along have jarred the men out of the jobs in the shops, and for the purpose of trying to rectify this very serious condition, the Railway Business Association has been formed to see what it can do towards restoration of business for the railroads and business for those who furnish the railroads with their material.

That reminds me a little of the story of the commercial traveler. In his rounds there was one particular hotel where they always had honey on the table, sweet, delicious honey, and he gorged himself every time he visited this tavern: he talked about it, and when he got home he told his wife about it; he told her that he hoped sometime when he was going the rounds he could take her with him and they would go to that hotel where she also could regale herself with this delectable sweet. The time came. Mother went along with him. They finally got to the tavern, and he had been telling her: “Tomorrow, my darling—honey.” So when they walked into the dining room and sat down in his accustomed seat at the table he looked around and there was no honey there. He suddenly turned to the waitress and he said: “Where's my honey?” And the waitress replied: “Oh, she done gone away.” That is about the way with our business. We were living in a land flowing with milk and honey, and all of a sudden “she done gone away.”

“THE RAILROADS AND THE BUSINESS REVIVAL.”

At a time when disaster has flooded the land, the first signs of returning prosperity are greeted as Noah received the dove bearing the olive leaf, with abounding joy. A real order for goods, after months of idleness, is an event. There is a temptation at such times to be thankful for small favors, forget past troubles, and settle down to an enjoyment of such benefits as may be vouchsafed, without asking whether we are receiving all that we are entitled to.

Far be it from my purpose to sound a sour note of pessimism, while the orchestra is doing an optimistic “stunt.” But business men who depend upon the prosperity of railroads for their profits and prosperity must not fool themselves by the thought that one election has brought or can bring about the railroad millenium.

It is not here yet, and it will not arrive until many things happen. Is it not absurd to assume that the recent election hinged principally upon the question of fairer railroad regulation, or that it was one of the issues that divided the country between Taft and Bryan? If it were a fact, then we who are so directly interested in the welfare of railroads might well view with alarm the rolling up of more than six million votes against the railroads.

Anti-railway legislation is not a disease afflicting one political party alone; it is too common among the adherents of all parties. Blows have been dealt railroads by both Democrats and Republicans.

There was received at the office of the Railway Business Association a few days since, from a manufacturing company producing railway material, the following letter:

"If the Railway Business Association had been formed a year ago, it would undoubtedly have done considerable good, but we think the results will be lost at this time, on account of the election of Taft, as it will probably produce normal business in a short time."

Evidently the morning mail of the writer had contained an order or an inquiry. He was happy. He imagined that the rising sun of prosperity was shining in the windows, and that the night of commercial gloom was wholly past.

Did all antipathy to railroads vanish from our land on the night of November third? Have all anti-railroad agitators been put to sleep? Does the placid smile of affection for railroads play upon the features of all those who by recent election have been given commissions of power over our railroads? Are there no vexatious problems of transportation yet to be solved, no differences to be settled requiring patience, knowledge and persuasion? Is the public mind converted to the idea that anti-railroad agitation is against the public interest? If all these beneficent things have come to pass, then there is no reason for the existence of the Railway Business Association, with its gospel of conciliation, nor is there necessity for any further effort by any one in behalf of railroads. The day of miracles is past. By no jugglery of words, or fantasies of imagination, can we avoid the stern reality that the conditions which have led to the existing state of public feeling as to railroads, which is the growth of many years, cannot be eradicated in a day, month, or year.

It is a matter for supreme satisfaction that since the election, the President-elect has expressed the hope that as a result of that event "investors may feel justified in investing capital, and in putting out funds for railroad construction," while giving assurance that under his administration "all men who conduct a legitimate business may understand that the Government is back of them." So far as the authority and influence of the Federal Executive extend, it is most gratifying to learn that this subject is under consideration by the incoming President, and there is sound justification for cheer-

fulness in the outlook relating to Federal executive activity. Presidents are powerful—that we know, but if railroads are to have the opportunity to do the things that must be done for this country, to keep pace with its transportation needs, they must have the friendly co-operation of men of all the political parties, men in all the States; not alone Presidents, but Governors, Senators, Congressmen, Members of the Legislatures, and Federal and State Railroad Commissioners. All these officials in the end will represent pretty accurately the temper of the public from which they spring. If the gallery to which they play is unfriendly to railroads, they will speak the speech and enact the laws that will win them applause. If the political atmosphere from which they emanate is calm, and reasonable regulation of railroads is what their environment favors, then their official conduct will be attuned to fair play.

If there ever was a time when organized effort for the bringing about of a better relation between the railroads and the people was absolutely necessary, it is NOW. He lives in a fool's paradise who deludes himself with the belief that there can be substantial, continuing prosperity for railroads and cognate interests until it is the permanent policy of our Nation that conciliation is a better way to get transportation facilities than warfare. Conciliation must be worked out as a practical plan—it must be tried, and it must be found feasible, before those who have been addicted to other methods will join those who seek to end rancor, ill-feeling and recrimination.

Be it understood clearly that in this scheme of conciliation the railroad managers have to shoulder a great, big share of the conciliating. They must be open and above board in all their dealings with the public, and when in contact with the people their pose should be that of kindness and not of hauteur. The rights of the railroads which should be accorded them cheerfully, should not be caused to be withheld by any acts which chill the hearts of those with whom they deal. What a splendid thing it would be for the country if the people at large could come to think of the railroads as their railroads! Not, of course, in the sense of Government ownership, but as guardians fully alive to the responsibility of giving them support, sustaining and encouraging them, and planning with them that they may become powerful doers of good for the country. Everybody knows, when he stops to think, of the magic transformation of our country wrought by the railroads. But wondrous as that has been, greater wonders are yet to be, if we can gain a clear foresight of the changed conditions that must be met in the future.

The problems of the future are radically different from those of the past. Not the conquering of the wilderness; not the connecting of the East and West, but the development of a vastly improved system which shall concentrate every device of modern science to the increase of celerity in movement of traffic. We must have more tracks; freight tracks independent of passenger tracks, devices of

acceleration at junction points; time-saving mechanism at terminals, and more and better equipment. It is upon these great problems of transportation that the American people and their representatives should concentrate their attention, dismissing the phantom problems, born of pique or prejudice, which have made recent railroad discussion at once tragic and ridiculous.

These mighty projects call for money by the millions upon millions. Will capital be attracted to railroad investment if larger profits can be made in other enterprises? Facing the future, with its colossal demands and infinite possibilities, how fatuous the thought of crippling our railroads by fixing niggardly rates through arbitrary legislative edicts.

But, says some cynical critic, you are not disinterested in your devotion to the welfare of railroads. To such a charge we plead guilty with enthusiasm. Do you know of any one who is? No such person exists in our country. Where in this broad land is there a man who will not benefit if railroads are prosperous? What of the thousands of retail tradesmen who thrive when railroad employes and employes of railroad supply concerns have steady employment at good wages? I point to the waving wheatfield, the husbandman assured of quick, safe and cheap carriage to market if railroads are prosperous; to the humming factory and busy foundry, if railroads are prosperous; to the unimproved real estate, leaping in value as demand increases under vigorous industrial expansion, if railroads reach it; to mercantile establishments enlarging and employing more people, if railroads are prosperous. Oh, we are all in it, only some people don't seem to know it.

It is from such, and their mistaken views that the country has suffered and will suffer more unless our people are brought to a realizing sense of their error. That is the task that we have undertaken, and we are not going to quit just because there has been an election. (Applause).

How much of a business revival, think you, we shall have, unless the railroads shall have restored to them their borrowing power, which will simultaneously restore their purchasing power? The power to borrow implies that somebody is willing to lend. That frame of mind toward railroad investment will be attained by the possessors of capital when there is a demonstration by the public, which holds the fate of such investment in the hollow of its hand, that no hostile legislation shall imperil the investment. (Applause).

The current earnings of a railroad cannot by any possibility provide funds for development to meet future demands. They can only convince the investor of the probable profit from prospective enlargement of operation. If the attitude of the public toward railroads is devoid of imagination as to the future, and insists upon reducing present revenues to the smallest possible amount, the investor will turn to other fields for investment, and woe be to America if he does!

The crying need of the hour is that Government officials and the public generally, in considering railroad problems, shall show, not their *power*, but their *wisdom*.

It is for railroads as America's most potent means to national prosperity and growth that I am an advocate; railroads with Herculean financial strength to cope with the problems of the future. Our mission is to clarify the atmosphere so that the people will look upon railroads as tremendous agencies of civilization, which have a record of glorious achievement, with their mental vision undimmed by too much contemplation of mere human error in their administration. Railroads must of course be operated by men, men with knowledge and genius, intermixed with human frailties. But men come, and they pass, adding their mental mite to the great work, while railroads must go on forever, growing greater and greater, and doing greater things as years go by. If Americans are wise to their own selfish interests, they will foster, they will guard them with the jealous care of patriotism and see that no harm shall come to them. No popular clamor which loses sight of their intimate relation with our national glory should be permitted to put these greatest agencies of progress in chains.

I am reminded of the man who arrived at a hotel late at night. As he was registering he said to the clerk: "I have some very important business in the morning: I want to be called at six o'clock. Now don't fail me. Make me get up." When the hour arrived, thump, thump, thump. Nothing doing. Thump, thump, thump. Finally a sleepy yawn, and the man answers, "What is it?" And the reply comes: "There is a message for you, sir." "A message?" Pretty soon the patter of footsteps was heard on the carpet, the door opened and he was handed a slip of paper, on which was written: "Why don't you wake up?"

To the manufacturers of railway materials and equipment who are hesitating, who are trying to count their coppers to see if they can hang on to one or two hundred dollars, or who are trying to delude themselves with the idea that hard times are all over and prosperity is dripping on us, "Why don't you wake up?" (Applause..)

THE CHAIRMAN: Gentlemen, it is customary for the members present to ask the speaker questions. We might reverse that to-night and ask you to answer Mr. Post's last question. I am sure that I voice the sentiments of the Club when I say we are very much indebted to Mr. Post for coming here to-night and giving us this very eloquent address on a subject that is dear to the heart of every railroad man. Doubtless some of you would like to say something before we close.

MR. SEELEY: I move that a vote of thanks be extended to Mr. Post for his most eloquent address.

Motion seconded, put and carried unanimously.

THE CHAIRMAN: Mr. Post, we have the pleasure of extending

to you this vote of thanks of the Club. Is there any discussion on this subject?

MR. W. A. SMITH: Mr. Chairman, I was delighted to read the address of Mr. McKenna before this Club a month ago and have been delighted to hear that of Mr. Post to-night. To one who has been endeavoring to talk and educate on just such things for thirty-five years it is naturally cause for self congratulation. I have another reason also for feeling pleased over it, because these gentlemen will in their work unquestionably have to meet what we have had to meet in the editorial chair for so many years, the statement that "It is not much use preaching to the converted. We are all with you. It is the people outside that we want to get hold of." Now, I am in thorough agreement with Dr. Post's diagnosis and prognosis of the situation and also have the greatest faith in his educational panacea. His justly celebrated emulsion of good humor and common sense must necessarily aid the digestion, regulate the biliary secretions, correct strabismus and I am certain, ward off threatened locomotor ataxia. A country whose nerves have been destroyed by the use of the political coffee which has been dealt out to it for so many years may possibly be soothed by a postum cereal course of this kind. (Applause.) If I were to ask any question—which the chairman has hinted might be in order—I would like to know just how this remedy is to be injected into those people who need it the country over. It is certainly very evident that they need that injection.

Some years ago a doctor traveling along a country road down in North Carolina came across a negro who had been stopped in the road by a balky mule and had given up the effort to get the mule to go. The doctor had his case with him and took it out and suggested possibly he could help; so he took a hypodermic syringe with a good dose of brandy and injected it into the hind leg of the mule, which immediately started down the road, smashing up the wagon, with the colored individual in full pursuit. As the doctor rode down the road he came across the colored individual sitting alongside the road, and when the doctor came up to where he was, he said: "Doctor, have you got any more of that stuff?" The doctor said: "I guess I have." "Well, I wish you would spurt some of that into me, because I am done 'bleeged to cotch that mule." I believe that is the situation to-day; the public mule has had that injection and he has broken loose and smashed up everything and it is time that something should be injected into the other side of the case. We are done 'bleeged to cotch that mule, or, as Col. Post says, we are done gone.

I think the question of manner has everything to do with this matter. There is not anything that the national administration has done in the way of actual legislation in the last four years that has raised all this commotion, but it is the way it has been done. The doctor himself has mistaken his own directions on the bottle. You remember the old fashioned prescription with directions written

on the bottle, given by the doctor to the ignorant nurse, "When taken to be well shaken." When the doctor came back after a while he found that the nurse had understood that the patient was to be shaken. Dr. Roosevelt's prescription has been administered to the patient in a similar manner with decidedly deleterious results.

You remember the speech that Secretary Root made in which he stated that if the states did not undertake legislation against the railroads the National Government would undertake that work and do it. I do not think that Secretary Root had the intention when he made that statement that the legislators all over the country should take it up, but the legislators received from that remark all the encouragement they wanted and in every state as the legislatures came into session there was a host of railroad bills inspired by that speech and the feeling that the National Administration was back of them.

Now this work of education is an important one. How are we going to get it into the right kind of people? I know it is a work that must be undertaken and must be carried on, and I also know that under the most discouraging circumstances everything said and done on the right side of the case must have its effect. The railway paper, it is said, is only read by the railroad people. That is not the case. We know and can trace the result of what has been said through our columns for a score of years or more. It has had its effect upon legislators, railroad commissioners and upon the teachers in their educational methods; so there is no discouragement for any effort put forth to reach the public mind. But how can the public mind be put right if there is nobody to tell them how or to educate them? The trouble with this country is that we go off in droves after the latest thing, no matter what it is. I can think of no greater fraud perpetrated on the public than the propaganda for a deep water way from the northern lakes to the Gulf, and yet the public and legislators take everything that has been said as true, because they only hear that side of the case. A great convention has been held in Chicago, another is to be held in Washington. Is there any hearing of the opposite side of the case, any question of what is right? Not at all. The politicians in this case expect to make capital for themselves. This man expects to be senator; that man wants to be governor. They take this stuff that is thrown together in the conventions and canvass the whole state. The whole eighty-five counties in this state have been visited by two politicians with stereopticons talking on this subject. Nine-tenths of what they said is false, only the public don't know it. How is the public to know?

In the matter of this railway legislation, it is of extreme importance, as Mr. Post has said, that the railway people, both the railway men themselves and those who have business dealings with them, should wake up and should undertake a persistent and strong canvass; and above all that they should not weary with well doing. The

trouble is we start in with these things with a flash, and in a short time it is all gone, but we must not forget that it requires persistent, continuous work, day after day, week after week, month after month and year after year. Any other kind of work defeats its purpose, because it is only a flash in the pan. "They have got through, they have said their say and that is all there is to it. The old ground was the right one, we say, so we go back to the old faith!" I would like to ask Col. Post if they have got so far in any plan for doing this kind of work and disseminating this kind of argument that he is prepared to state any of the methods the Railway Business Men's Association expect to follow in educating the public and the railway people?

MR. POST: I think, Mr. President, that that would lead to such an elaborate portrayal of the programme that at this hour of the night would probably be more soporific than instructive and I would ask that Mr. Smith allow me certain hours of his time at some not very far distant date, when I will promise to fill him so full of it that he won't want any more.

THE CHAIRMAN: Is there anyone else who wishes to discuss this subject?

MR. M. A. GARRETT: I shall be very brief in what I shall have to say, but the words of the speaker have been not only a delight, they have been not only entertaining, but they have been very impressive. They are spoken with a seriousness and an earnestness which carry with them conviction and which together mean results in the future. He spoke a few words which I would like to repeat. He said it is not *power* that we want in the hands of railroad commissioners, but it is *wisdom*. Those are pregnant words. Now the question is how can you get wisdom into those railroad commissioners? It is very easy. They are politicians, but just the same, politicians get scared at a band of voters, and they will run like a scared dog if you show them you mean business. Now then the word is *education*, as Mr. Smith has said, as Mr. Post suggested and as Mr. McKenna mentioned here a month ago. It is education. If we could find a Coin Harvey to write such a book as was written twelve years ago about the silver question and which did so much to rouse voters on the Silver Issue—I say, if we could have such literature written so as to reveal to all the great and destructive unfairness that has obtained through the misrepresentations of demagogue and Muck Raker, such an overwhelming sentiment would be engendered as would be friendly and sane instead of unfriendly and unreasoning, and we would soon have results that would be entirely favorable to the railroads; and not only favorable, but fair. And fair dealing and a fair show is all the railroads want.

THE CHAIRMAN: Does anyone else desire to discuss this question? If not, a motion to adjourn will be in order.

ADJOURNED.

The David L. Barnes Library

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The David L. Barnes Library of this Club, at 390 Old Colony Bldg., Chicago, is open for the use of members and their friends, and we hope it will be used freely. It is open on week days from 9 a. m. to 5:30 p. m., except on Saturday, until 3 p. m. Books must not be removed from Library, but the Librarian will assist visitors in finding information and will promptly reply to letters from out-of-town members desiring information from the Library. Donations of books and technical publications will be gratefully received.

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The regular monthly meeting of the Western Railway Club was held at the Auditorium Hotel on Tuesday evening, December 15, 1908, First Vice-president W. E. Sharp in the chair. The meeting was called to order at 8 P. M. Of those present the following registered:

Ames, C. F.	DeVoy, J. F.	Hinds, J. B. L.
Ayers, A. R.	Dewar, J. I.	Hopkins, G. H.
Axtell, G. F.	Dodd, T. L.	Humphreys, C. J.
Bacon, C. G., Jr.	Eddington, W. J.	Jenks, C. D.
Bell, R. W.	Eiler, John	Jett, E. E.
Bickel, A. M.	Ewing, C. J.	Jones, L. E.
Boedefeld, F. J.	Faragher, R. S.	Kilpatrick, J. B.
Borrowdale, J. M.	Fenn, F. D.	Kelley, H. D.
Bourne, G. L.	Flavin, J. T.	Kucher, T. N.
Bowen, H. A.	Fogg, J. W.	Langan, J. N.
Bower, J. G.	Forsyth, Wm.	LaRue, H.
Bowes, C. F.	Fowler, W. E., Jr.	Lickey, T. G.
Breckenridge, L. P.	Furry, F. W.	Lovell, C. P.
Bronson, J. L.	Gale, W. T.	McAlpine, A. R.
Brown, R. L.	Goodnow, T. H.	Mackenzie, D. R.
Brown, S. D.	Goodwin, G. S.	Macpherson, A. F.
Bryant, G. H.	Graves, F. W.	Manchester, A. E.
Bryant, P. J.	Graves, R. I.	Martin, P. A.
Byers, J. J.	Guilford, A. L.	Midgley, S. W.
Callahan, J. P.	Haig, M. H.	Monroe, M. S.
Carlton, L. M.	Hahn, F. W.	Moody, W. O.
Carney, J. P.	Harahan, J. T., Jr.	Moore, A. C.
Chadwick, A. B.	Harkness, F. L.	Motherwell, J. W.
Chisholm, J. E.	Harris, D. T.	Nathan, C. A.
Christenson, A.	Haynes, J. R.	Neely, B. J.
Cooledge, F. J.	Henderson, T. D.	Osborn, C. H.
Cory, C. H.	Hennessey, J. J.	Parsons, Otis
Crownover, G. M.	Hibbard, M. W.	Passmore, H. E.
Curtis, J. J.	Hildreth, F. F.	Peck, P. H.
Derby, W. A.	Hill, G. H.	Peterson, C. H.
	Hincher, W. W.	Pownall, W. A.

Price, R. C.	Squire, W. C.	Walbank, R. T.
Raidler, W. P.	Stark, F. H.	Webb, E. R.
Riddell, Chas.	State, R. E.	White, J. S.
Rowley, S. T.	Stimson, O. M.	Wickhorst, M. H.
	Stocks, W. H.	Willcoxson, W. G.
Schmidt, E. C.	Stott, A. J.	Winn, C. F.
Seley, C. A.	Sturgis, R.	Wirtz, P. P.
Sheffer, A. M.		Wolfe, Chas.
Schroder, H. F.	Taft, R. C.	Wolfe, F. E.
Sharp, W. E.	Taylor, J. W.	Woods, E. S.
Shumate, F. D.	Tavse, W. G.	Woods, J. L.
Simons, J. E.	Tetlow, E. W.	Wright, L. S.
Slaughter, H. W.	Thompson, J. R.	Wright, Wm.
Snead, J. M.	Towsley, C. A.	Youngs, F. A.
Squire, F. G.	Tratman, E. E. R.	Zealand, T. H.

THE CHAIRMAN: Gentlemen, please come to order. The first order of business will be the approval of the minutes of the last regular meeting. Unless there is objection or correction, they will stand approved as printed.

We will have the Secretary's report.

THE SECRETARY: Mr. Chairman, I have the following membership statement:

NEW MEMBERS.

Name.	Occupation.	Address.	Proposed by
A. E. Duclos, Sales Mgr. Massachusetts Chemical Co., Chicago, Ill.			E. F. Smith
R. W. Benson, M. E. Pullman Co., Chicago, Ill.			C. A. Seley
Chas. Dyer, 2nd V. P. Rodger Ballast Car Co., Chicago, Ill.			J. O. Neikirk
E. L. Philipp, Prest. Union Refr. Transt Co., Milwaukee, Wis.			J. J. Hennessey
E. Z. Hermansader, R. H. F., C. M. & St. P. Ry., Chauning, Mich.			A. E. Manchester
H. H. Molyneaux, C. L. S. & E. Ry, Chicago, Ill.			J. P. Callahan
J. J. Byers, National Mall. Castings Co., Chicago, Ill.			J. P. Callahan
Jas. Ryan, Engineer C. & W. I. R. R., Chicago, Ill.			J. T. Bronson
Thos. Dolan, Loco. Foreman Pass. Dept. B. & O. R. R., Chicago, Ill.			D. R. Mackenzie
Edwin E. Seyfarth, Chief Clerk to M. M. C. & W. I. R. R., Blue Island, Ill.			C. A. Barnes
Vernon Elliott, Stenographer to M. M. C. & W. I. R. R., Chicago, Ill.			C. A. Barnes
M. J. Schaboni, Eng. Despatcher, C. & W. I. R. R., Chicago, Ill.			C. A. Barnes
J. E. Libby, M. C. B., Swift Refr. Car Line, Chicago, Ill.			E. E. Jett
M. F. Covert, A. M. C. B., Swift Refr. Car Line, Chicago, Ill.			E. E. Jett

RESIGNED.

A. N. Wilsie, Supt. C. B. & Q. Ry., St. Joseph, Mo.
H. E. Wilson, Amer. Loco. Equipment Co., Chicago, Ill.
J. E. Simons, Loco. Engr. C. & W. I. R. R., Chicago, Ill.
K. J. Bowers, Acme White Lead & Color Wks., Detroit, Mich.
J. C. Steen, University of Wisconsin, Madison, Wis.

Membership, November, 1908.....	1,519
Resigned	5
	1,514
New members approved by Board of Directors	14
	1,528

Mr. Chairman, those are all the statements I have at the present time.

THE CHAIRMAN: The first paper of the evening on the subject of "The Abuse of the Master Car Builders' Association Repair Card," is a subject that is of vast importance to all the railroads and car owners and is a subject that interests each and every railroad employe, and I hope you will discuss it thoroughly. The author of this paper hardly needs an introduction. It is very fitting that the paper should be presented first to the Western Railway Club, and especially by the Chairman of the Arbitration Committee, Mr. J. J. Hennessey. I now have the pleasure of presenting to you Mr. Hennessey.

THE ABUSE OF THE MASTER CAR BUILDERS' ASSOCIATION REPAIR CARD.

BY MR. J. J. HENNESSEY, M. C. B., C. M. & ST. P. RY. CO.

To the President and Members of the Western Railway Club:

At its annual convention of 1896, the Master Car Builders' Association incorporated into the Master Car Builders' Rules of Interchange effective September 1, 1896, the following:

SEC. 16, RULE 4.

When repairs of any kind are made to foreign cars, a repair card shall be securely attached to outside face of intermediate sill between cross-tie timbers. This card shall specify fully the repairs made, reasons for same, date and place where made and name of road making repairs, etc., etc.

This requirement has remained in the Rules of Interchange every year since 1896, and is still required under rule 76 of the present code. In revising the Master Car Builders' Rules of Interchange September 1, 1897, and since that time down to the present day (excluding the exceptions noted in last line of rule 4), intermediate or delivering lines were relieved from responsibility of wrong repairs not made by them. (See 1908 code, 2nd paragraph, page 2; rule 4, page 4; rule 47, page 19; and last sentence of rule 86, page 38.) The 1897 amendment referred to, rendered the use of the Master Car Builders' repair card all the more necessary, as, in relieving the intermediate or delivering roads from responsibility of wrong repairs not made by them, it "boiled down" so to speak, the matter of adjustment to two parties only, viz: the car owner and the road who actually made the wrong

repairs. If, as required by the Master Car Builders' rules, the road who did the incorrect work applied a Master Car Builders' repair card covering the items objected to, its identity would of course be immediately known, and the adjustment of the account would then be a very easy matter. The application of the repair card in all cases of repairs to foreign car equipment as required by the Master Car Builders' rules, is not, I am very sorry to state, being done, and the fact that these repair cards are not being applied, brings to us a very difficult problem for solution. The road with which I am connected, has cases coming up every day where our cars are offered home to us with wrong repairs to sills, trucks, draft gear, and other very expensive parts of our equipment, and the expense of correcting same is enormous, and we cannot afford to bear it. The repair card is invariably missing, and we are then forced to the only other method of ascertaining by whom the repairs were made, and this leads us to that same old story of tracing with its attendant voluminous correspondence, loss of time, and expense, to say nothing of the burden placed upon the office forces of our Motive Power and Car Accounting departments. This difficulty has been growing worse from year to year, until now it presents to us a very serious condition with no apparent relief in sight. It is to be deplored that this particular rule is so flagrantly violated. Here we are an association of Master Car Builders, organized for the purpose of concerted action in various lines, the most important of which is the successful interchange of freight cars. To thoroughly understand each other in the workings of this particular branch of the business, we have agreed upon a code of rules, the carrying out of which necessarily means that railroads must be honest, otherwise the plan would be a complete failure. In the regular course of business our cars drift hundreds of miles from home and we have to depend upon the honesty of the foreign lines in the matter of repairs and the rendition of bills. There are instances without number, where foreign roads have noted upon their repair cards that wheels were renewed account of sliding axles renewed account cut journals, air hose renewed account missing, and numerous other parts repaired or renewed, for which the possessing road assumes the expense of such repairs account of the manner in which the defects were brought about. If the foreign lines were dishonest they could have reported such defects as the result of ordinary wear and tear and rendered bills for the work. It would not, therefore, be consistent for us to assign dishonesty as the cause of non-application of the repair card when repairs are made to foreign cars. My personal opinion is that it is due to indifference on the part of our repairmen. I have heard it said that the application of the repair card is not really necessary in view of the fact that the stub of such card reaches the car owner with the repair bill, or when sent through the mails in case no bill is rendered. This we all know is a grave mistake, as it is necessary to know immediately when car reaches home, where the incorrect repairs were made in order to avoid the objection-

able tracing. It has also been stated that insufficient time is given to execute and apply repair cards when making up trains or when trains stop for only a brief period at repair points. I have looked into this and found that by having repair cards dated and signed, that it requires only a trifle more additional time to fill in the other necessary data and apply the card, as it means only minor repairs such as air hose, journal bearings, brakes shoes and the like. I am therefore satisfied that this objection can be overcome if only an effort is made. The road with which I am engaged has what we term a traveling inspector, who is continually traveling over our system. It has been made part of his duties to look over foreign cars taken off our various repair tracks; also such foreign cars as receive minor repairs in the yards. If he finds any repairs made to such cars and no repair card attached covering the items, he makes report to headquarters and also to the foreman in charge at the local point, and the party at fault is easily located and disciplined. Headquarters also censure the foreman for allowing such violation, so that there is considerable incentive for the foremen to be vigilant in this regard. We have found this to be productive of very good results, and we have also found that the mere issuance of an order to apply repair cards in all cases of foreign car repairs, does not bring about the desired result; there must be something done to show that you mean to have the order obeyed. If our practice in this matter can be improved upon (and I believe there is always room for improvement), I sincerely hope the discussion here will bring it to light and give us all the benefit of whatever profitable ideas will be advanced. I also believe that the universal suffering among railroads and private lines due to the non-application of repair cards, makes the subject one that should be taken up by all the railway clubs in the country and thoroughly discussed, which will undoubtedly result in advancing some proposition that will bring about the desired condition.

THE CHAIRMAN: Gentlemen, you are all very familiar with the abuse of the M. C. B. repair card as it has been pointed out by the author of this paper. It is hardly necessary that I shall have to call upon you, because we could cite cases without number, with an endless amount of unnecessary correspondence, representing a loss to all parties interested before claims were finally adjusted, and I hope we may have a full discussion with a view of correcting or improving these conditions. I will ask Mr. Stark to open the discussion.

MR. F. H. STARK (Pittsburg Coal Co.): Mr. President and Members of the Western Railway Club: I have been a member of this organization for a number of years, although I have not had the privilege of attending for the last five or six years. From the subject of the paper, it would indicate that we are all somewhat under the ban, and perchance my friend J. E. Simons, or some one, has given the Chicago people a tip that we people down in the Pittsburg district have the

reputation of manufacturing iron and "steal" for a living, so that perhaps anything I may say may not have much weight.

There is one feature that I would ask, and that is that you eliminate me as a representative of private car owners. I would feel very lonesome if I felt I was not in a small way at least a sort of a railroad man, and down in my home territory I am allowed some recognition and am considered a part and parcel of the railroads, so far as the interchange rules are concerned.

Mr. Hennessey has sounded a timely note of warning, and we, as representatives of the Mechanical Department, should consider the subject seriously. We should temper our statements with moderation and not excite any undue alarm, for it is a noteworthy fact that the Mechanical Department is the only branch of a railroad that enjoys the authority to create and revise rules, making the railroads a party thereto, without the approval of our superior officers. Thus far we have run well, and I doubt if any can cite—with possibly a rare exception—a case where the head of a Mechanical Department has even encouraged the violation of the spirit of the rules.

When the Chicago agreement was about to be grafted into the M. C. B. rules, all these possibilities appeared to me in a vision, and I corresponded with the late J. N. Barr on the subject along the lines referred to by Mr. Hennessey in his paper and many other possibilities, many of which have only been too true.

Notwithstanding my prejudice, I was an early convert to the Chicago agreement, and am still in favor of the principle of our present rules. We must, however, throw all the possible safeguards around the execution of same. Certainly, there would be no man who wants to play fair, who would object to placing any safeguards around the rules; that will not entail any additional burdens on the inspectors, nor will it interfere with the prompt and free interchange of cars.

When you stop to consider that we have approximately two million freight cars in service, the average cost of maintenance, including depreciation, is perhaps \$80 per car annually, and where about 15 per cent of this covers the work done by foreign railroads, there is no private nor corporate interest where confidence alone is the fundamental principle, where we place our interests in the hands of others without definite check and, in many cases, without redress.

For various reasons the American Railway Association has advanced from mileage to per diem, which not only expedites the movement of cars, but at the same time reduces, or removes the possibility of the misuse of cars, or perhaps the failure to report the actual mileage made.

Mr. Hennessey, in his fatherly way—for he is one of the pioneers—says that there is no occasion for alarm and that commissions and omissions are usually committed by misinformed or over-ambitious subordinates. In this I heartily concur, and I will add to this list some few unscrupulous piece-workers, more especially where the work

is done in the yards where men actually report work in order to increase their daily earnings although the actual work has not been performed. Mr. Hennessey recommends that discipline be exercised to reduce the practice to a minimum.

I call to mind a case when I was on the Wheeling & Lake Erie Railroad, when our inspector secured an M. C. B. defect card covering longitudinal sills damaged by derailment, the derailment taking place in our own yards after the car had been accepted. Possibly he imagined that this sharp practice would be appreciated, but to his surprise, we immediately dismissed him.

I call to mind another case within the last few years where a railroad was applying secondhand couplers to our cars and noting on the repair card and stub, "new couplers." I was in position to know that that particular railroad was not buying couplers of that make and upon investigation it was very readily run down, and I invited the car foreman to come around to my office. Unfortunately he did not know what I had up my sleeve, and he invited the General Car Inspector to come along, which embarrassed me very much. However, I had to tell my story and the practice was discontinued.

There are two changes in the rules that might reduce improper charges; for instance, lack of information regarding location of parts repaired. The Railway Club of Pittsburg has recommended for the last four years that in addition to giving the A and B end, that we give the exact location of the part. While this would apply to truck columns, column guides, side bearings and many other parts, it would apply more particularly to journal bearings applied. There are thousands of journal bearings charged to the owners to-day, not wilfully, but because the clerk in the office does not have any means to know whether the journal bearings were applied to one journal or separate journals, consequently, in the face of doubt, he gives his own company the benefit of the doubt; while every reasonable railroad man will concede that when a car leaves a terminal and perhaps every division there is a journal bearing applied, it is pretty good evidence that the bearing is applied to the same journal. The remedy for this would be the practice that, so far as I know, is still in vogue on the Lake Shore Road. It was adopted by the C. L. & W. and is now in force on the Wheeling & Lake Erie. The objection is that it requires too much clerical work, but it is a simple method, and the most illiterate man gets familiar with the idea in very short order.

We already have put on the repair card "B" and it requires no time to put "R. 1" or "L. 1" as the case may be. If a journal bearing is applied to the inside journal on the right hand side, he simply notes on the card "B.R.2." When the repair card stubs are sent into the office, the clerk whose duty it is to make the bills separates these cards and withholds making a bill for more than one journal bearing to that particular car.

Returning more particularly to the subject presented by Mr. Hen-

nessey, and that is, the failure to apply the M. C. B. repair cards and defect cards covering wrong and improper repairs. The common excuse of the repair man that he does not have time to make out the repair card is not a valid one, for the reason that emergency repairs seldom, if ever, raise any question on the part of the car owner; it is the repairs that are made on the shop and repair tracks under the supervision of a car repair foreman, and there is ample time to make out the card in every case. There are only two roads that ever send to us the M. C. B. repair card stubs marked "No bill" as prescribed by the present rules.

I would ask that every man interested in the car department go home and ascertain why, when they make repairs that exceed the combination, the delivering road being responsible, they do not send the repair card stub marked "No bill" to the car owner on or before the 20th of the succeeding month. That is a question we want to ask ourselves; if we are absolutely honest about the matter we would put into practice the carrying out of the rules. There are occasions when "No bill" repair card stubs are attached to the bill with other stubs, but these usually cover minor repairs. We very seldom find the M. C. B. repair card attached to the car, or a stub attached to the bill covering wrong repairs. Why?

In this connection I would recommend for your consideration the rules which I suggested to Mr. Taylor a year ago, and that is, that a new clause be introduced, reading something as follows: "A railroad repairing a foreign car and failing to attach an M. C. B. repair card and the owner of the car is able to secure bona fide evidence that that car was repaired and the repair card not attached, that the owner report that to the Arbitration Committee, the Committee to use its own discretion." I would suggest first that they write to the man in charge at that particular point and call his attention to the omission, and if the practice is continued, the Arbitration Committee should call the attention of the head of the Mechanical Department to it. This could all be done without it being advertised to the world, and if the head of the department failed to correct it, then let the Arbitration Committee report it to the General Manager of the road, and I am sure there is no man who would want the report to go into the General Manager's office that he has been violating the rules.

I thank you, gentlemen, for the privilege of discussing this subject. It is a matter that every car owner is interested in, and when you stop to consider that the private car owner pays to foreign roads nearly as much for repairs as their own shop charges, or, in other words, the cost of maintenance is made up of your own shop repairs, which constitutes the bulk of the material and labor, and the railroad charges almost as much for incidental repairs, consequently it amounts to a great deal more than it does to a railroad, but even in the case of the railroad it is 15 per cent of \$160,000,000, which is quite

an item, and I believe that if we could introduce the location of parts in that connection, it would save the innocent party. For instance, a C. B. & Q. car comes to the Lake Shore, and the Lake Shore applies a draft timber of the proper dimensions, and frames it properly, he complies with the rules and applies an M. C. B. repair card; the car goes east and some other road breaks the other draft timber and for some reason they make a poor job of the work and the man is ashamed of it and he omits his repair card; the car returns home and the owner finds a draft timber applied of different dimensions, not properly framed; he finds a Lake Shore repair card on the car, he immediately secures a joint evidence card and takes the matter up with the road that made the first repairs properly and makes him pay the bill. Now, that would apply to hundreds of cases and that would all be avoided if there were just simply put on there, "to the right side" or "to the left side," on the repair card and stub.

MR. P. H. PECK (C. & W. I. R. R.): We have found at Chicago that the interchange of records is a good thing; it is a deadlock on the inspector; why not adopt the same thing in repair cards? That is, get the cards made with these carbon copies where you take four at one writing; one to go on the car, one to go to the car owner and one to the office to bill on. That is a deadlock. As to the case cited by the last speaker of the car coming home with two draft timbers on under the plan I have suggested the car would have two cards, the duplicates issued, as soon as possible; they would have the prices for the repairs, and what repairs had been made, such as brasses, etc. That would be a check, the same as the interchange records are in the city. We know how valuable that is in tracing and I do not see why it would not be the best thing to do in the case of repair cards.

MR. H. E. PASSMORE (T. & O. C. Ry.): It occurs to me from Mr. Peck's remarks that if the other man does not make a report, the use of carbon cards will not do any good. The Lake Shore people make their repairs and issue a card; but if the other fellow who puts on the second draft timber does not put on a card but follows the same practice that he is doing now, you would not have your second report and therefore could not locate it and hold the Lake Shore responsible except that we locate the work, as was suggested by Mr. Stark.

THE CHAIRMAN: Gentlemen, I do not think we should try here tonight to revise the Masted Car Builders' Rules; I do not believe there is a business in the country of the magnitude of the interchange and repair work that is being conducted solely on a code of honor. This code of rules has been in existence for quite a number of years, and I believe we all agree that they are rules that have been formed by impartial men, and the paper that we are discussing here is the abuse of these rules. Now, instead of suggesting changes at this time let us confine ourselves to the discussion of the proper enforcement of the rules. Perhaps there is a reason why we would all like to get away from the real issue. Mr. Goodnow, may we hear from you?

MR. T. H. GOODNOW (L. S. & M. S. Ry.): Mr. President and Members: I think that the real importance of the repair card lies in its protection to the owner from any wrong repairs; in fact, on the road with which I am connected, that is the only use that we try to make out of it. We make no attempt to take the cards off and send them into the Accounting Department as a check on the bills, depending absolutely on the stubs that accompany the bills themselves, and in this connection I think I am safe in saying that in not more than one-fourth of the cases of wrong repairs are we able to locate the parties who make them. In very few instances are the repair cards on the cars, and in tracing, as Mr. Hennessey calls attention to, after getting a pound or two of papers, we are no nearer results than we were when we started tracing the movements of the car. Tracing the car all over foreign lines invariably results in the reply that no record of any repairs can be found, which to my mind indicates that while the road is probably honest in the reply that it makes, especially in the case of minor repairs, it does not have the right system of keeping records of the repairs at its outside points and practically no record is made of it at all.

The Lake Shore is still maintaining the system that Mr. Stark called attention to in showing the location of repairs, and I agree with him that it is essential that all roads should adopt it, as it certainly protects, especially in the case of journal bearings.

Taking up the question why repair cards are not applied, I do not agree with Mr. Hennessey in one thing, and that is in the application of repair cards in train yards. We are trying to put on the repair cards, and we find that it is impossible. I do not refer now to the yards where the trains are made up, but in intermediate terminals, where you run your fast trains through by simply changing the engine and caboose, and we have all the terminals equipped with air brake men who go over the cars at each terminal to make repairs, changing the hose, gaskets, as well as inspectors who change the brasses in case of hot boxes, and it would be impossible, or greatly interfere with the movement of the train to hold it up for that inspector to write out a repair card. In such cases those cards go to the office every morning and are mailed out that day to the car owner. At shop points I think it is due in a great many cases to the way in which the repair tracks are O.K'd. At least, every time I get after it, I find that the inspector we employ for that special purpose wants to get home a little earlier and we do not know it; somebody takes it up with us and we find he has gone home at 5:30 when he ought to have stayed until 6:30 and written out the cards.

Mr. Peck's suggestion in regard to the repair card is one that I have thought very favorably of, for the reason that in tracing as to why there is no repair card on the car, we are invariably told that the repair card was put on and lost off. Now, that will do away with that excuse and they will have to get up a new one. One or the other card

will be received, or it will be prima facie evidence that it never was made out.

I do not entirely agree with Mr. Stark's remark about piece work. That is a new one on me, for I did not know that any one was handling piece work where they did not have a check on it. I should think it would pay the railroad company to get a check on piece work returns, which can only be done through the supervising end and not leave it entirely in the hands of the workmen; in fact, I think it is almost the universal practice, either at outside towns where the piece work system is installed to have the foreman take care of that, or at larger points where the forces warrant, a piece work inspector. As a matter of fact, there are very few companies putting defect cards on for wrong repairs at the time they are made, as required by the rules and that makes it absolutely necessary for the car owner, in order to have any protection at all, to get the repair card on the car, and that must be at the time that the car is received and the joint evidence is secured, otherwise it is almost impossible to get the card and the joint evidence together. Several roads that I know of make an attempt, and we ourselves have made the attempt, to check wrong repairs from bills, but we do not find that successful; that is, in sending the joint evidence in and having it checked up with the bills as they come in, because of the large number of bills received, and the immense number of cars appearing in same to check against. I should judge that the best way to handle it would be by having the repair card put on the car so that you will have it at the time of receiving the car and close the transactions right there.

MR. J. P. CARNEY (Mich. Cent. R. R.): I know that the rules for applying repair cards are not lived up to, and I think there should be something done to have them complied with. Of course, on cars that are repaired in the yard or around the different freight houses where they are located some distance from repair track and office, as they are in a great many instances, and the class of car repairers obtainable in most cases cannot write the English language, consequently in order to apply repair cards in every instance, they would have to go to repair track office for same, and it would be impossible to get them on at all times; also inspectors do not have sufficient time to apply them in most cases. I think the repair card should be put on cars so as to locate the party making wrong repairs.

MR. H. LA RUE (C. R. I. & P. Ry.): I do not think there is anything that I can add to what Mr. Goodnow has said. We all realize the situation, and as it is the desire of the Chairman that no remedies be suggested, why, we can just talk about the abuses and then go home, and it will be just the same as the Gentlemen's Agreement used to be in regard to rates years ago; it was all right until they got on the car to start home. I think the same as Mr. Stark, that something should be done by some Association that has the power to enforce the

rules so that they will be enforced on all alike; no favors shown to any one.

THE CHAIRMAN: There is no desire on the part of the chair to shut off discussion in the form of suggestions, but I just wanted to direct the discussion from running altogether to suggestions, believing the present rules are sufficient if properly executed. It is open for discussion in any way you see fit. Mr. Barrowdale, may we hear from you?

MR. J. M. BARROWDALE (Illinois Central R. R.): I think this subject has been pretty well covered; I do not know that I have anything to add to it.

THE CHAIRMAN: The author of the paper said to me this evening that if the gentlemen of the Car Department would talk as freely as they wrote suggestions to him, it would take all night to dispose of his paper. Mr. Philipp, will you give us your views?

MR. A. PHILLIP (Union Repr. Transit Co.): Mr. President and Gentlemen: Being one of the latest acquisitions to the Club, I hope I will not be judged immodest in speaking so early. I am not here with a kick, but merely want to call attention to a practice which we feel is often a hardship, and I think there are many others here who feel upon the same subject as I do.

We receive a great many cars with wrong repairs, wrong material, poor workmanship, with no repair cards. Now, the cars in their trip have probably passed over five or six and sometimes more different lines. We have tried on many occasions to take the matter up by correspondence to ascertain who made these wrong repairs. We find ourselves with a large amount of correspondence and practically no information. The stereotyped answer is, "No record on this line of any repairs." About six months afterwards, as is often the case, somebody sends a bill. It is almost useless to trace it. We have tried it many times, but six months after the transaction, six months after the repairs have been made, the road that makes the bill insists that the work was done right and there is nothing left to do but pay it.

Now, it would seem only fair to the car owner that we have the privilege of inspecting this work. It cannot possibly hurt the man on the track of the road that does the work right; it is fair to those who do it right and it ought to be fair to those who do it wrong. Now, I quite appreciate that it is difficult to devise a system that would meet the requirements of any and every instance, and I rather like the plan suggested by Mr. Peck, whom I have not the pleasure of knowing, that in every instance where a repair is made, a duplicate of the card stub be mailed to the car owner. In most cases it is not much of a clerical job. A man who can write at all can make out an additional card if it is necessary, or perhaps it might be possible, by using another carbon, to make an additional copy. If that could be sent to the car owner,

it would be a check upon the man who does the work and it would protect the car owner at the same time.

I do not assume for a moment that the railroad companies wish to collect from the car owner—no railroad would care to collect from a car owner for anything that was improperly done. I take it that we all wish to give value received. We are not seeking protection against the railroad company, but we are seeking protection against the dishonest employee. Any scheme that would bring that about, I believe, would be profitable to all. Of course there is an agreement between railroads, and particularly railroads of equal size, a certain amount of reciprocity. The employes of one road probably make no more errors than the employes on the other road, and in that way you gentlemen may get even. There cannot be any reciprocity, however, from the standpoint of a private car owner. We make no repairs, there is nothing that we can bill against you; you make your bill against us, we have got to pay. I know you all want to treat us fairly, but in this particular instance we sometimes get the worst of it.

MR. PECK: One word more. Mr. Hennessey's paper treats of the improper use, or you might term it dishonest use of the repair card. The Master Car Builders' Association has plenty of rules, and good rules as far as they go, but they do not enforce a penalty. We have laws enough in this State to keep any man from doing wrong and we have plenty of jails and penitentiaries to keep a man straight, but they do not obey the laws, and this repair card deal puts me in mind of the Irishman who said to another, "Pat, where were you going when I saw you yesterday? I saw you going down town and I think you were in a hurry, because I did not see you until you were out of sight." That is the way with this card; the card is usually out of sight.

MR. PASSMORE: I gather from several remarks that have been made on the subject that the trouble is primarily caused by our not obeying the rules. We complain because the other fellow does not put on the cards for wrong repairs. If we all obeyed the rules there will not be any other fellow. The thought was suggested by Mr. Stark to carry out the practice which is now in effect on the Lake Shore road of locating the parts repaired either right and left. In the case of journal bearings or draft timbers, it occurs to me it would be a good idea to combine both Mr. Stark's idea and Mr. Peck's idea, provided we can get the other fellow to put on the cards. There is always a question to know whether we can compel a man to put on the cards; perhaps he does not know how to write out the card or anything else. In short, it is up to us to see that the cards are put on.

MR. PHILIPP: I probably cannot introduce any new excuses. No doubt they are familiar to all of you, but it would answer the purpose if the card were attached to the car, if you were certain that the employe would do his duty in every instance, but the experience is this—whenever we write to a road that there was no repair card on

the car, we get this uniform and stereotyped answer, the card was applied; if it was not on the car when it reached you, it must have been removed by some vandal. Now, gentlemen, there is no answer to that; we can not go any further, and you cannot go any further after you have instructed your employes to put them on. We will be met by the same situation. You are not going to be able to say that that is not true, that the employe failed to put it on; he will say he put it on; when the car shows up in the railroad yard we will have the same old excuse. Now, it would seem to me that it would avoid all that if the owner were to receive a copy by mail: you would know whether your employe put it on there or not, or whether the vandal had been so active.

MR. LA RUE: There is one side of the question that I do not think has been mentioned. Most of the wrong repairs, in my opinion, are minor repairs, or parts of the draft timber, that is all. Do railroad companies and the railroad car owners expect a repair yard to carry a list of any stock required to repair all the parts of every car they handle through a big terminal? I do not think so. A car comes to your road with some part broken. I think it is just as much for the car owner's benefit to put any parts in that you can get hold of that are as near the standard as possible. After you have done that, you have favored the car owner by moving his car promptly; he gets the per diem rather than to hold that car and telegraph for a casting. Then you want the repair man to put the repair card on and penalize himself for expediting the car for the car owner and getting it returned to the car owner. I think that that subject should be looked into.

MR. STARK: May I speak just one word on that subject? I believe the experience in our territory is not along the line indicated by Mr. La Rue. I do not believe there is any car man that sends a tracer after a wrong truck column, or a wrong truck column guide, or anything of that sort. What they do want redress on is where a road puts in sills, an end sill and frames it improperly and makes some omissions. We had a car recently that was repaired and the party omitted the grab-irons and some of the corner bands and other items, and yet he contended that the repairs were properly made, but there was no repair card attached. It is not the repairs that are made out in the yards, the emergency repairs that the car owner is interested in.

In regard to the wrong charges for piecework, I referred particularly to the piecework system out in the yards where the trains are made up. I leave it to your judgment whether there is any car foreman who can cope with ten or fifteen pieceworkers. He cannot do it. When I was with the B. & O. at Baltimore, we had three hundred car repairers working at piecework and every man was as good as the inspector. I admit, the pieceworker is all right in shops where you can exercise due supervision, but when you introduce it out in the repair yards, it is not only the foreign car that is abused, but it is the railroads' own cars, and if we could take Mr. Peck's suggestion,

the only objection I can see would be the volume of stuff that the railroad would have to transport by mail or express; but I believe if that could be carried "deadhead" it would not be much of an objection, and if it is not an objection it is a good idea, and if we couple with that the full identification of the parts, and the publicity clause, which is popular to-day—the United States Steel Company and all these big corporations are going to open up to the public—why, let us have a publicity clause, and I am sure that every man who wants to maintain his reputation will instruct his man to put the repair cards on.

E. E. R. TRATMAN (Engineering News): It appears to me that the question discussed by Mr. Hennessey is largely a matter of discipline and the enforcement of rules. It is easy to issue orders, but it is very difficult to get these orders obeyed in everyday service, as is shown by ample experience in all kinds of railway work, to say nothing of other branches of work. Thus in the proper firing of locomotives, in the proper handling and loading of freight, and in the operation of the train service, there is continual trouble in getting even the regular rules obeyed continually and as a matter of course. The responsibility for this is very generally placed upon the employees who disobey or neglect the rules. But it must not be forgotten that the responsibility must be shared by the officials who give the orders and make the rules and then fail to see that they are properly enforced and obeyed. The best method of remedying the difficulty in regard to wrong repairs on freight cars appears to be that suggested by Mr. Hennessey, in which there is an inspector charged with the special duty of seeing that the orders as to repairs and carding are carried out in practice. These officials would, in fact, be in the same class with traveling auditors, traveling engineers and shop inspectors. If an order is simply given out by a written bulletin, the employees are apt to think that they can obey or neglect it as they choose. But if they find that such neglect leads to reprimand, fine or discharge, it will not be long before they understand that the orders are meant to be obeyed.

MR. GOODNOW: Mr. Hennessey in the last lines of his paper calls attention to what he deems the necessity for having this discussed the country over, and I believe that this is right, for the reason that the Master Car Builders' Association has a committee on this very question this year and I am sure that the discussions of the different Railway Clubs will be greatly appreciated on their part, and in view of that I will make a motion that the Secretary be instructed to correspond with the Secretaries of other Railway Clubs, to see if we cannot have this brought before the different Clubs, which should be within the next two months, so that we will have the benefit of it before the next convention. I make that as a motion.

THE CHAIRMAN: Is there a second to the motion?

Seconded by Mr. La Rue.

THE CHAIRMAN: It has been moved and seconded that the Secre-

tary of this Club be instructed to take this matter up with the Secretaries of other Railway Clubs with a view of having it discussed, so that the committee on Revision of Rules may have the benefit of this discussion. Is there any discussion of this motion? If not, all in favor signify by saying "aye." Contrary "no." The motion is carried.

If there are no further remarks on the paper, we will call upon the author to close the discussion.

MR. HENNESSEY: Mr. President and Gentlemen, the only object I had in jotting down these few remarks was to stir up the animals some. I think we all agree that the M. C. B. repair card has been abused, and is being abused a great deal more today than it was ten to twelve years ago. I want to ask you gentlemen the reason for this. Simply because the men in authority do not say to their subordinates, "You must apply a repair card when making repairs to foreign cars," and insist on its being done. The first time discipline them, the second time dismiss them, and I will assure you that you will not have to dismiss many men; they will attend to business. It is simply one of the subjects that has drifted along, each year getting a little more lax, until finally the repairers think, "Well, I guess we need not bother." The man in the yard who ought to put on the repair card is not the one that has the burden of trying to locate where the wrong repairs were made.

As far as being unable to put the repair card on in the yards where trains are made up, I still believe that we are as capable of doing it today as we were fifteen to sixteen years ago. We accomplished it then and we can accomplish it now if we only get down to business and insist on having it done.

But leaving that point aside, conceding that part of the argument to be true, is that the class of repairs that we are tracing for? No, the class of repairs that we are tracing for is the improper repairs, of sills and other expensive items,—or what you may term partial repairs, such as a set of draft timbers being applied, a new headblock placed over broken end sill, end sill being broken at the same time, but covered up. When car gets home the owner has to bear the expense of applying end sill; there was a combination; that is what they tried to evade, when we come down to plain talk. If every man at the head of the Car Department would say to his employes, "You must do thus-and-so, if you do not, another man will," I will assure you they will do thus-and-so. It may cost them a little labor, and wherever you butt up against human nature, you will find that if employes can avoid labor and nobody censures them for it, why, the labor will be avoided. That is the size of the whole thing.

The M. C. B. rules give protection to railroad companies and the private lines, if they are only lived up to honestly, and if we do not, why, the whole thing is a farce. The very foundation of the rules is honesty and without honesty they amount to nothing. (Applause.)

THE CHAIRMAN: Gentlemen, we will now declare this subject

closed and take up the second subject of the evening, which is a paper by our worthy Past-President, who needs no introduction to this body of men. Mr. Seley's subject is "Life of Side Sheet of Wide Fire Boxes."

MR. C. A. SELEY (C. R. I. & P. Ry.): "Mr. Chairman, I suppose I ought to make an apology for offering a paper to this Club on a matter of pure speculation. I have no data to offer; I built up a theory on a set of conditions which I believe represents the result that we are getting in the life of the side sheets of the modern locomotive. 'The matter is not new, because it was discussed in the Master Mechanics' Association in 1905, the subject in part being covered by the topical discussion by Mr. Lawford H. Fry of the Baldwin Locomotive Works. There is one paragraph of his paper which I would like to read, part of which I agree with for reasons other than are assigned. He says: 'As the water in contact with the side sheets is turned into steam, it must be allowed to rise to the steam space and must be replaced by other waters. The water spaces should be so designed that this natural circulation is aided and that the currents of steam and water impede each other as little as possible. This is secured if the firebox sheets are vertical or with a slight slope outward as they rise from the mud ring, so that the steam can rise along the fire box sheets and the water descend along the outside sheets without mutual interference.'"

THE LIFE OF SIDE SHEETS OF WIDE FIREBOXES

C. A. SELEY, M. E. C. R. I. & P. Ry.

The life of side sheets in fireboxes of modern locomotives presents a problem which demands attention on account of their short life as compared with the older types.

A prominent mechanical officer recently stated the matter about as follows: That the old style deep firebox with O. G. sides was rather hard on staybolts, but the boxes lasted on an average of from six to nine years. The later wide fireboxes, while easier on staybolts, frequently fail in two or three years. On this showing it was thought that the tendency in firebox design would be towards a modified O. G. side with very flowing lines.

The above statement presents an effect and a possible remedy without stating the causes which bring about the shorter life. It is unfortunate if we cannot utilize an increase in the width of the grates to secure the area necessary in large locomotives without such a loss of life of the side sheets. It has not been noted that the crown sheets are similarly affected. There has been no radical change in the quality of the steel employed, nor of the fuel or service demanded of the locomotive that would account for the trouble, and we are forced to the conclusion that there must be some element in the design or

operation of wide fireboxes which has an unfavorable influence not clearly understood.

By the life of side sheets is meant serviceable condition, freedom from cracks, leakage, and other failures that may require renewal. The life is not particularly affected by the pressure carried, as the staying is generally done with a large factor of safety, but is directly affected by the temperature changes, the expansions, and contractions in service under steam and when out of service, laying on sidings, over cinder pits, in washing out, and water changing.

Steel will stand a certain number of stresses before failure, dependent on the degree or amplitude. We can increase the number of vibrations of a test specimen in a machine by decreasing the amplitude. In a firebox it is difficult to decrease the number of the vibrations as these are set by the service of the engine, the number of times it is fired up and cooled off, and these conditions are not materially different for the two types of fireboxes under discussion.

It may be, therefore, that the vibrations or movements of the side sheets of wide fireboxes are of greater amplitude to account for the shorter life.

At first thought one would say that the O. G. box presents a series of curves that will adjust themselves to meet those movements in a way not possible in the straight and more rigid side of the wide box. This is true only in part, as the side is straight longitudinally in both designs and this is the most important direction. Apparently, therefore, the increased amplitude is due to higher internal temperature of the side sheets by reason of less perfect heat transmission to the water in the leg.

In the later designs of boilers we find a general tendency towards the use of wider mudrings and water legs than formerly. This has resulted in giving staybolts longer life, as their increased length gives less angular movement. It has, however, decreased the rate of the flow of the water upward as the volume of water in the leg is increased. This point will be considered later.

In getting away from the O. G. form of box and the narrow water leg, it was thought that the circulation of the water would be improved, as the O. G. presents a curve adverse to the direct vertical rise of the water as it is heated and displaced by the cooler water coming from the throat. The results prove this theory wrong, or at least we have only gained in life of staybolts.

The secret of the matter seems to be that, if the rate of flow and its wiping, scrubbing, impinging action can be directed against the side sheets it has the effect of wiping off the steam bubbles as they form, prevents their combining into a film or curtain of steam against the sheet, which is by no means as good a conductor of heat as is the solid water. This theory will account for increased internal temperature of vertical and inwardly inclined side sheets and can be inferentially proven.

It is well known that crown sheets outlast several sets of side sheets, and while this is due in part to the fact that there are not the same variations of temperature at the same time in different parts of the sheet, it is also true that its surface presents no chance for formation of a film of steam and it has practically solid water in contact.

This is also true of the Wooten type of furnace, the parts failing being generally a limited portion at the sides, which approach the vertical. It has also been noted that the door sheets of fireboxes which have moderately inclined back heads do not last as long as those that are vertical. The incline forces the wiping action of the circulation against the outer sheet.

It has been stated that in the early days of torpedo boat design a locomotive type of boiler was tried because of its great efficiency and amount of steam produced per foot of heating surface in locomotive service. On the boat, however, it was an utter failure. By way of experiment this boiler was put on a vibrating cradle, which greatly increased the steam production. This could only be accounted for by an increased circulation, facilitating the heat transmission. It has been proven by late Government experiments that increased boiler efficiency can be obtained by increasing the rate of flow of the gases, this action tending to wipe off from heating surface partially cooled gases, replacing with hotter.

Thus the questions of circulation, whether of water or gases, seems to be a very important factor in boiler efficiency, and while some of the examples quoted may be somewhat remote in their application, yet they seem to point to the circulation in the water leg as being a vital factor in the life of side sheets.

There seems to be no question that if there is a strong impinging circulation against the fire sheet, that the heat will be more freely transmitted, steam film prevented, solid water maintained against the sheet, and the internal temperature of the sheet kept down and the amplitude of the sheet movement reduced to the minimum.

To effect this the side sheets should not be vertical nor sloped inward but be sloped or curved outward from above the fire line, but it is obvious that this cannot be extreme without getting into grate area difficulty.

It is quite possible, however, that we have gone too far and are too liberal in that respect, as the reports of successful steaming of some recent engines would seem to indicate, these engines having a much lower proportion of grate area than is common.

If this reduction can be made, it will permit the modification of side sheets as proposed. The question might also be raised as to the width of water leg. Aside from affording sufficient room to hold the accumulated sediment to a safe height, there seems to be no good reason for a wide leg except from the staybolt point of view. There is no question of a stronger circulation with the narrow leg, and if need

be, some form of flexible staybolt could be considered for extreme cases of angular movement.

In the older designs of fireboxes it was often 80 inches from mud ring to the water level above the crown sheet, this water varying in temperature, while in circulation from 150 or 180 degrees at the bottom to the temperature due to the steam pressure at the top. The depth of this column of water in wide firebox designs is sometimes materially decreased, and as the temperature limits are about the same, it is apparent that for an equal width of water space the rate of flow of the circulation as a whole would be decreased about proportionately to the travel.

If in addition to this the width of water leg be increased, the rate of movement is further decreased.

If rapid circulation and a wiping effect will serve to carry off the steam bubbles, preventing steam film and overheating of fire sheets, this function has been absolutely sacrificed in most wide firebox designs and the short lived side sheets seem to prove it. The highest duty boilers are those having the most rapid circulation. The water spaces in legs and between tubes of fire engine boilers are very small but the probabilities are that the rate of steaming and efficiency would be decreased if these spaces were materially increased and the larger volume of water would lower the rate of circulation.

It is quite likely that the rate of movement in the locomotive water leg has much to do with this question. The water next the fire sheet has an upward tendency. That next the outside sheet can only rise when heated by conduction through all the water particles the entire width of the leg or by the mingling, mixing action set up by curving the sheets from the vertical. There seems to be a reasonable ground for the belief that there is a very sluggish circulation in a directly vertical water leg of considerable width, contributing to formation of a steam film and overheating of the sheets when fires are forced.

This discussion would not be complete without considering the other end of the temperature scale to which the fire sheets are subjected. As before stated, it is the amplitude of the vibrations or movement of the sheet which are most subject to control. All possible mileage should be made between knocking out of fires. Firing methods can often be improved so that an engine can be turned without knocking the fire. The usual ash pit methods use up much of the life of side sheets and cold water washing and filling, and hurry up firing up takes a lot more. It is quite true that the old time fireboxes had to stand all this, but while considering temperatures and their effects it would be just as well to help on the lower end of the scale if possible.

Improved methods of blowing down and filling up of the boiler at terminals, hot water, water changing and washout plants are now well demonstrated and these will all help to reduce the amplitude of the temperature scale traversed in locomotive operation as regards the firebox sheets and add to their life.

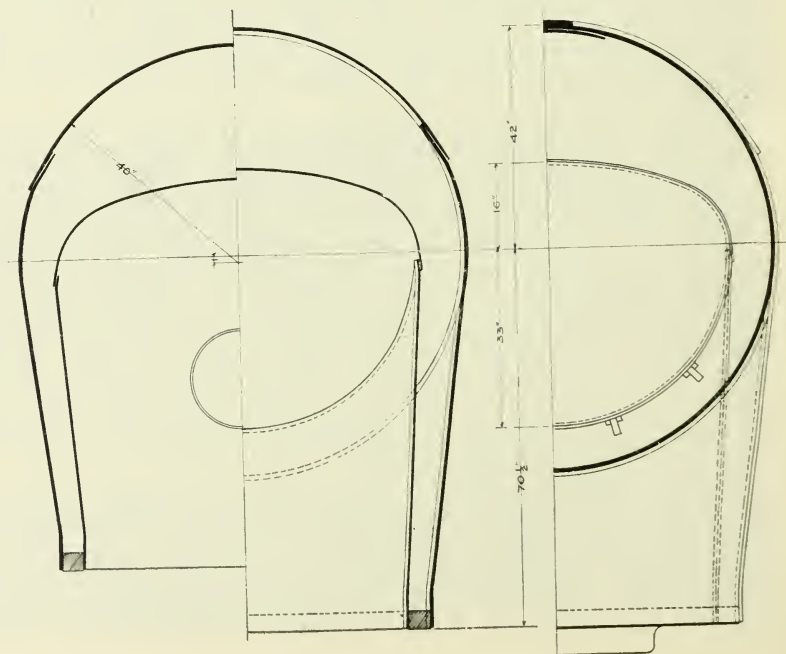
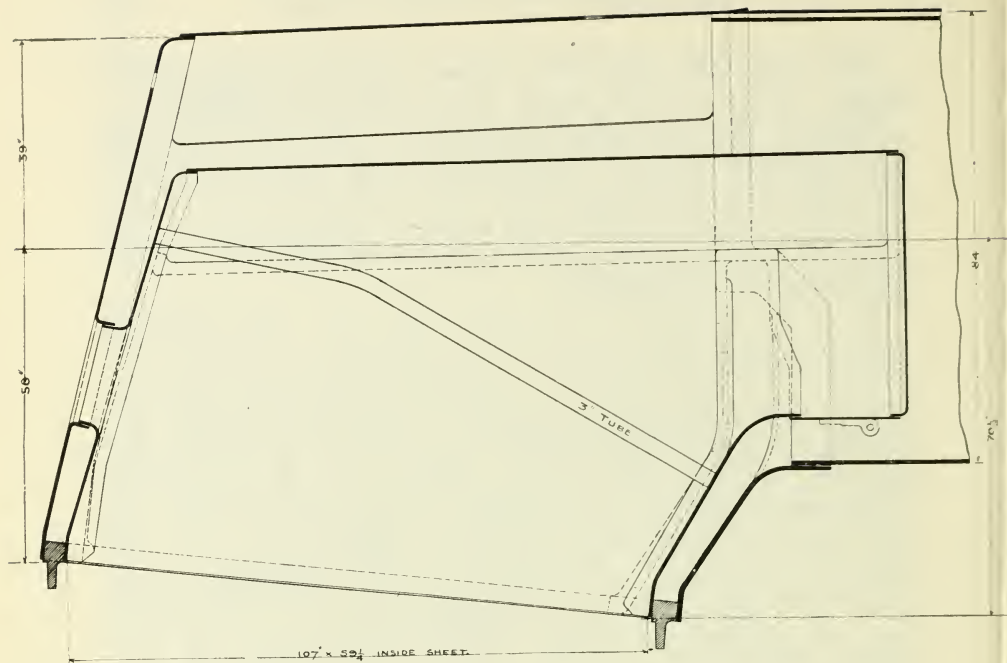
THE CHAIRMAN: Gentlemen, this paper is now before you for discussion. Mr. De Voy, may we call on you to open the discussion?

MR. J. F. DE VOY (C. M. & St. P. Ry.): I did not have the least idea of what my friend Seley was going to talk about at this meeting. I have listened very intently and jotted down a few notes, and inasmuch as we have done something in that line, I believe you will at least accord me the liberty of telling you what has been done, and in order to do that, I want to show you a blue print of a fire box that we use, to demonstrate a few of the ideas.

If you will pardon me, I will start with a few notes I made on something in which Mr. Seley did not agree with my friend Lawford H. Fry, in what he said five years ago regarding fire boxes, which we at that time thought would be dead long before the bad points could be found out, so do not think because I am going to differ from Mr. Seley on this, that I therefore like Mr. Lawford H. Fry's idea, because I do not. I believe what Mr. Fry said before the Master Mechanics' Association, that the water following the inside of the fire box did assist materially in saving the fire box is absolutely true. The old O. G. fire box would take just that sort of a shape (indicating on blue print); it would curve. The modern wide fire box will be in the shape of the pen. The wide fire box as designed today—it is an abortion, and I do not care who says any different,—the wide fire box is an abortion—does not allow the water passing from the injector and flowing down from the side, then again taking that upward tendency as it boils away from the inside sheet and presses toward the outside sheet, allowing the water to flow down the side, so that there is no question but what Mr. Fry's idea was right at that time. I want to read now.

In June, 1906, before the International Boiler Makers' Association I made a statement that I thought a moderately wide fire box—that is, what I call a moderately wide fire box, sixty inches in a seventy-two inch diameter—with flat fire box side sheets and wide water legs to admit of free circulation was what we were coming to. My reason for this was to endeavor to construct a boiler in which the cost of maintenance would be cut to a minimum, for in watching results obtained between the wide and narrow fire boxes in use on the Chicago, Milwaukee & St. Paul Road I found that the narrow fire box engine was by far the most economical as far as the boiler repairs were concerned. In fact, I say that there is not any question but that the old narrow fire box was the most economical to maintain. Now, how can I prove that? It is not a theory.

We have eighteen Atlantic type locomotives with narrow box, 42 inches wide, to be exact, about ten years old—four of them have had a new door, flue, crown or side sheet in ten years. In twenty-eight Atlantic type locomotives, with wide fire box—in this particular boiler it was 62 inches wide, and the fire box was 66½ inches wide. I maintain that the diameter of the boiler here at the third sheet or dome



sheet must be wide enough to admit of the slanting inward of the sheet in order to keep that covered, as the water boils upward all the time. In the twenty-eight Atlantic type locomotives which I speak of here, that was not so; it was so wide at that point that it did not permit that, and I contended then, and I do contend now, that it was the water not being kept against the sheet that cracked the side sheets, so of the twenty-eight Atlantic type locomotives with wide fire box about seven years old, each one of them had a new door, flue, crown or side sheet; some had as many as three sets of new fire box side sheets in that time, seven years, and there were only four altogether of the narrow fire boxes. In a year's time 140 staybolts were applied to the narrow box Atlantic type and 585 to the wide. Now, the fire box shown here is what I call medium wide. Don't get them mixed, because my ideas on fire boxes have been mixed a great many times by people who either did not understand what I was talking about or did not want to.

I found that leaky flues and staybolts were reported once in the narrow fire box to ten times in the wide fire box. A set of flues lasted about twice as long in the narrow fire box as in the wide.

With such a favorable showing for the narrow fire box over the wide, I decided—there is a gentleman in the room over me who helped to decide that, the Superintendent of Motive Power of the Milwaukee Road—I decided that a boiler could be gotten out with a moderately wide fire box, which would do the work of the wide fire box and would be much more economical in maintenance. Now, did we have the nerve to do it?

A boiler embodying the ideas as illustrated here is now being used in 170 Prairie type locomotives and five Atlantic type locomotives on the Milwaukee Road, and there are 40 to be constructed at our shops and 37 at outside builders, so that illustrates whether we have nerve enough to put into use our ideas.

Fifty of the Prairie type engines have been in service thirteen months but no sheets, arches or flues have been renewed and not a staybolt has been broken. The engines prove to be excellent steamers and are economical on fuel. That is a very strong statement to make but I realize that the staybolts and the flues in any boiler ought not to begin to show any unsatisfactory results until at least nine months or a year after they are put in service, but it is the best information we have of what we believe to be correct.

The fire box is 60 inches wide—in other words, we have widened out here and narrowed up six inches there (indicating on blue print). So that the grate area is not so much as that in that very bad acting and shallow fire box. Before I get through I want to tell Prof. Breck-enridge a little bit about that long, deep fire box, because I think he will be interested. The fire box is 60 inches inside the mud ring, with 4-inch water space. In regard to that 4-inch water space, I will say that I would have gone a little bit wider if I had dared to, I did

not have the nerve to. I had a letter from Mr. Ben Johnston, Superintendent Motive Power of the Mexican Central Railway, in which he sent me a drawing of a water space 8 inches in width, but I did not dare to go that far for a starter, although I believe he was right. Four inches water space at the mud ring, widening out to seven inches at the top. You see that width there, widened out to the top to seven inches—the side sheets are as free from curves as possible. My reason for having them as free from curves as possible is that there is an extension on the inside of the fire box which cannot be properly taken care of in that type of boiler. With an O. G. shape—I am not saying anything about the O. G. shape, but I do say that that distance permits that expansion to a greater extent than it would be if it were an O. G. straight here and turned out. The reason that the O. G. did break so many staybolts is that it was expanded up to about that point, then up at the top corners it took a shear about and broke all the staybolts that were on both corners. That is the reason of it.

The side sheets are as free from curves as possible and slope outward as they rise from the mud ring. This feature greatly helps the natural circulation—the same as Lawford Fry said it did—and the currents of steam and water impede each other very little. That is, the currents of water boiling away from the inside sheet, impede very little the downward circulation of the water coming in, and that you must have. The steam rising along the fire box sheets and the water descending along the outside sheets without mutual interference. I do not know that that “mutual interference” is just exactly the mechanical term, but it expresses my idea of it.

In a box with side sheets sloping inward, as they rise from the mud ring, the steam tends to rise from the side sheets through the water legs and along the outer sheets to the steam space, which interferes with the descending water.

The increased width of water space over our other engines also increases the flexibility of the staybolts. I would have gone out to the 8 inches if I had to; maybe I will some day if I get the chance—and the engines have proved this to be true.

These boilers are fitted with combustion chambers.

Now, I will tell you the reason why they are fitted with combustion chambers. This will not be new to you because I stole this from the head of the Mechanical Department of the University of Illinois, so I do not claim any originality in this line, although it is absolutely true. I quarreled with one of the locomotive companies, in connection with my superior officer, all one afternoon for an additional inch in depth of throat, for one inch more than what they wanted to give us. In other words, I believe up to three years ago we had a depth of area greater than anybody in the United States: at least, that I knew of, for the reason that about the point that I show you as the top,—the greatest fire is about to that height (indicating) when the coal is to be burned. Now, in Illinois coal it is not a hard matter to burn the carbon con-

tents, I never have thought it was anyway, but the volatile matter—or length of smoke, as Prof. Breckenridge puts it, does require some space to turn and it gets it as it passes back of the brick arch and forward to the combustion chamber, and it does mix the internal gases better, and the mixing of the internal gases in the fire box of a locomotive boiler, and the proper mixing or fluctuations of the water on the inside are absolutely responsible for all fire box failures, and I realize very well what I am saying and what objection there will be to it by boiler washers.

Boiler washing has not got all to do with it. I have said many a time that a man could design a boiler that would do away with this and we have done away with a whole lot of it, and that is by a recent device to have the length of flame or length of space in which the volatile matter is burned, or mixed, or whatever you term it. That all shows there (indicating).

Just a few remarks about the taper, about the difference in the sloping of the sheets. You might ask, why does it not slope the same way, that is, away from it? The water does not circulate at the back head of a boiler anywhere nearly as much as it circulates there (indicating). In fact, I doubt whether it circulates at all back there. And another thing, I would say that a man was almost out of his head if he carried that much away on a locomotive boiler. That is absolutely unnecessary, that is all taken off. There is not much of any heating surface taken away, so that while that is a little bit at variance with the other theory, still you cannot do away with it at all.

I most thoroughly agree, gentlemen, with the speaker in all the other ideas that he has advanced, only those perhaps were not quite in line with what I took issue with him on; I did not so much wish to take issue with him as much as to demonstrate our ideas as to a boiler, and I thank you very much for listening to me.

THE CHAIRMAN: It seems as though it would hardly be necessary to call on any one to continue this discussion.

MR. W. C. SQUIRE (Cons. Engr.): I would like to ask Mr. Seley a question. In his paper he stated that there was always solid water on the crown sheet and further stated for that reason they had very few or no failures of same. He then stated the side sheets would have to be sloped outwardly from the mud ring in order not to have the steam and water currents interfere with each other. If it is true that a crown sheet always has solid water on it, then with a side sheet which was inclined inwardly from the mud ring and approaching the same plane as that of the crown sheet, one would naturally expect to get identically the same results from such construction because the upgoing or rising bubbles of steam must pass through the water that surrounds them above the side sheets as much as they do on the crown sheet. The confines of the water leg would have no bearing on the general proposition on this basis.

MR. M. H. WICKHORST (C. B. & Q. Ry.): Mr. Seley has taken a

little bit unfair advantage of those of us who would like to discuss his paper by not having it printed beforehand.

I am inclined to agree with both Mr. Seley and Mr. De Voy that the fire box sheets fail—(I presume by failure you mean cracking of sheets), due to the water being kept away from the sheet. I do not think, however, that it is kept away principally by defective circulation. I am hardly prepared to think that that has very much, if anything, to do with the matter of fire box failures.

First, about these two currents in the inside water leg that Mr. Seley mentions, an upward current along the inside sheet and a downward current along the outside sheet. I am inclined to think that we have simply the one upward current. As far as I can see from the evidence, we do not really know. My observation would lead me to believe that the current is entirely backward along the barrel of the boiler, close to the two sides and ending up in the back; that is, the water that is evaporated from the fire box goes backward from the barrel. Anybody who watches the deposit of mud in the boiler will find there is no mud along on the front mud ring; it will accumulate along on the back mud ring and on the back ends of the side mud rings, showing that the circulation must be rapid in the throat and very slow when it gets in the back water leg.

As regards the reasons for overheating the sheets, I have rather concluded, from my own observation of the matter, that the water is kept away from the metal by the formation of scale or by the deposit of mud. If the metal is kept perfectly clean and free from scale, some tests I made indicate, that the metal cannot get very much hotter than the water; in fact, I got an increase of temperature of perhaps 50 degrees above the temperature of the water, but allow scale to form, and particularly a thick scale, and the metal can actually come to a red heat. When a fire box sheet becomes corrugated, for instance, I take that fact as an evidence that the metal has become red, otherwise it could not get into that wavy condition, because the metal has plenty of resistance until it does become red, and when we consider the large mud accumulation that may occur in this part of the boiler, we can easily understand that the water can be kept away sufficiently to allow actual burning of the metal.

Now, in fire boxes where we have trouble with corrugated sheets, we practically always have staybolt troubles also, but we find where we treat the water so as to avoid all the scale formation and avoid foaming and mud accumulation by heavy blowing, we avoid this formation altogether, we find we have practically no corrugated side sheets and we have practically no leaky staybolts.

MR. DE VOY: I said one thing that possibly might be misconstrued. Now, the first requirement of locomotive boilers is proper washing; that is one of the essential features, so do not think that I mean that changing the water, when I spoke of changing the water or standing over ashpits, has all to do with it. Do not conflict that

with boiler washing, because the boiler ought to be washed out, ought to be washed with warm water if we can do it; but a great many, nearly all of the cracked side sheets that crack 18 to 24 inches above the mud ring are caused by improper circulation of air on the inside of the fire box and by water between the fire box and the outside sheet on the road. Cracked side sheets have really occurred in the actual operation of the engine many and many a time.

MR. WICKHORST: Do I understand, Mr. De Voy, that you say cracked side sheets occur on the road, while the engine is running?

MR. DE VOY: Absolutely, and put the engine out of business, flood the fire box. Where would it occur, in the shop?

MR. WICKHORST: Why, yes. I have hunted up records of cracked sheets, and out of quite a bunch I found only two where it occurred where the engine was not cold at the time. About 70 per cent of them were in the hands of the boiler washers and we have had them occur right in the shop, when nobody was working on the boiler. I give below some extracts from my paper before the American Society for Testing Materials in 1906, which may be of interest in this connection:

CONDITIONS OF FAILURES CLASSIFIED.

About two years ago a lot of records and papers concerning failures of fire box sheets were gathered out of the files in the Superintendent of Motive Power's Office of the Chicago, Burlington and Quincy Railway Lines East of the Missouri River, and a classification made of the conditions under which the failures occurred, with results as shown below. These failures include only those occurring as ruptures, or sudden failures.

	Number.	Per cent.
1. Washing—Cooling	3	7.7
2. " Using nozzles	16	41.0
3. " Filling	2	5.1
4. " After filling	7	17.9
5. In shop or house, cold	7	17.9
6. In house, hot	2	5.2
7. Discovered arriving at terminal	2	5.2

It will be noted from the above that 71.7 per cent. occurred while the engine was being washed, this including 41 per cent. where nozzles were being used at the time. 17.9 per cent. occurred while the engine was cold under other circumstances, making a total of 89.6 per cent. for the failures while the engine was cold, and thus leaving 10.4 per cent. for such failures while the engine was hot, but it is not improbable that if the full details were at hand of the conditions attending the failures in these latter cases, that in some or perhaps all, the records would show the engine had been cold. When washing the boilers, cold water had probably been used in all cases, and the above

figures would seem to argue very strongly in favor of keeping the boiler continuously hot, and to use a method of washing out where the boiler does not get cold, say not below 150 degrees Fahrenheit.

TEMPERATURE TESTS OF FIRE BOX STEEL.

If the metal is at any time heated to a red heat or to near a red heat failure from this cause would be the natural result, and in order to get some information concerning the temperatures actually attained by locomotive fire box sheets, etc., under conditions of service, I arranged to get an electric pyrometer consisting of a platinum thermo-couple and galvanometer, and the intention was to work the boiler at rates similar to service conditions, and insert the junction of the thermo-couple through a small hole drilled in a stay bolt, extending across to near the fire side. Tests of this kind have not as yet been made, but some preliminary results have been made with



FIG. 1.—Temperature Tests of Fire Box Steel Apparatus.

the apparatus shown herewith as Fig. 1. From this it will be seen that the method of test consists of boiling water in a can with thin sheet steel sides, with a bottom of half-inch boiler plate, four inches in diameter brazed to the sides. The boiler plate has a hole drilled into the side one-eighth inch in diameter extending to the middle of the plate. Heat is supplied by a specially constructed "Pepper Box" burner which gives a lot of gas flames over a flat circular area of about four inches in diameter. The junction of the thermo-couple is inserted into the hole of the plate to the middle, and the temperature is read on a galvanometer. Some preliminary results are shown in Fig. 2, from which it will be noted that if a fire box sheet (including flue sheet) or the flues are free from scale or mud, the tempera-

ture of the metal probably does not at any time exceed the temperature of the water more than 50 degrees Fahrenheit, providing of course the circulation is sufficient to keep the water always in contact with the metal. Under the conditions of this experiment with no scale or water on the plate, the metal attained a temperature of about 1300

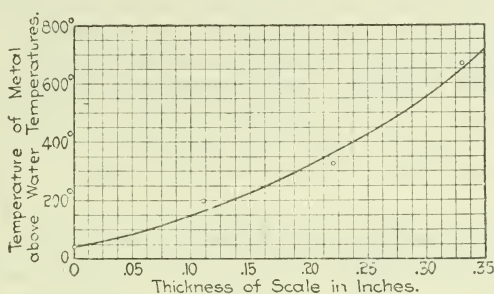


FIG. 2.—Temperature Tests of Fire Box Steel. Curve of Results.

degrees Fahrenheit, and it will be noted from the diagram that with one-eighth inch scale the metal attained a temperature of about 200 degrees above the temperature of the water; with one-quarter inch something over 400 degrees.

In a locomotive fire box, the average temperature of the metal if not protected by the water, would probably run between 2000 and 3000 degrees Fahrenheit, and with scale one-eighth inch thick and with water in the boiler, the experiments indicate that the metal including fire box ends of the tubes, can readily attain a temperature of several hundred degrees above the temperature of the water, and it is not unlikely in some cases that the metal actually attains a low red heat.

MUD ACCUMULATIONS.

The action of the heat causes the water to flow upward between the tubes, and the counter current must flow downward between the tubes and shell of the boiler. The water evaporated from the side and other sheets of the fire box is probably supplied mostly by a current flowing backward along the bottom of the barrel of the boiler. When this current reaches the flue sheet it divides, half going to each side water leg, the current finally ending in the back water leg where the two side currents meet. Of course while this backward movement of the water is going on, the formation of steam also maintains an upward movement. This circulation carries all solid material that is light enough to move with the water, into the back water leg where the circulation is probably least rapid. The heavier particles of mud and very light scale deposit on the back mud ring up as high as the fire line which is about six inches above the mud ring. There is on the back mud ring a cubic foot or so of quiet water space into which

the mud and lime sludge is first carried, and when this space is filled up, deposits accumulate on the side mud ring and finally accumulations may occur on the front mud ring. Critical examination of the mud deposits in a boiler after the water is drawn out is apt to show very little if any mud on the front mud ring, and a depth of six or eight inches on the back mud ring with more or less mud on the sides. No mud is apt to be present in the barrel of the boiler, as determined by a view through an inspection hole in the back flue sheet under the flues. Where there are also scale deposits, these will be found mostly in the barrel of the boiler and on the front mud ring as scale is too heavy to be carried round by the circulation, but the mud deposits will be found about as I have described above. The usual scale

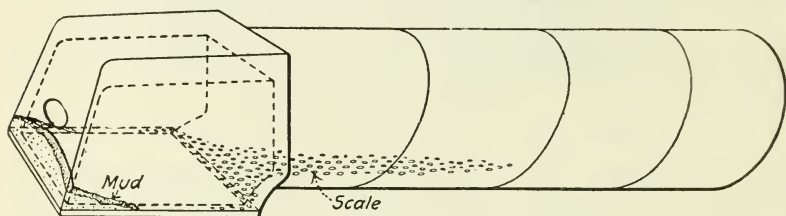


FIG. 3.—Mud and Scale Accumulations.

and mud deposits are illustrated in Fig. 3. Up to a height of four or six inches above the mud ring, the mud accumulations remain below the fire line and cannot cause over-heating of the sheets, but if more mud is allowed to accumulate in a boiler, it cannot be taken care of in this space. Such excess mud makes more or less trouble by keeping in the water circulation, depositing quickly on the tubes, crown sheet and particularly in the side and back water legs as soon as active steam production stops, and in this way is apt to cause over-heating of the side and back fire box sheets by preventing free access of water.

If by means of a blow-off arrangement the back mud ring can be kept free from mud, it would seem clear from the above considerations that the boiler can be kept free from excessive mud accumulations since all the mud is carried by the circulation into the back mud ring. A blow-off in the middle of the back water leg right above the mud ring removes mud from where it tends to accumulate most, but experience has shown the author that the mud is removed right around the blow-off cock, but on either side the accumulations are not disturbed. This led to trial of blow-off pipe laying on the full length of the back mud ring and perforated with holes spaced about four or six inches apart. This arrangement has been tried somewhat extensively and experience shows that mud can by this means be thoroughly removed from the boiler without the necessity of cooling down the boiler and washing.

Where water is treated with soda ash, the function of the soda ash

is to cause the lime and magnesia salts to come down as a sludge instead of adhering as scale, and the circulation then carries the sludge into the back water leg where it can be successfully removed through a perforated blow-off pipe placed on the back mud ring. By a combination of treatment of water, with soda ash, the perforated blow-off pipe mentioned and system of blowing out at terminals, engines can be made to run regularly 5,000 miles between wash-outs and without change of water other than obtained by the blowing out at terminals. A perforated blow-off pipe arrangement suggested for general use is shown in Fig. 4.

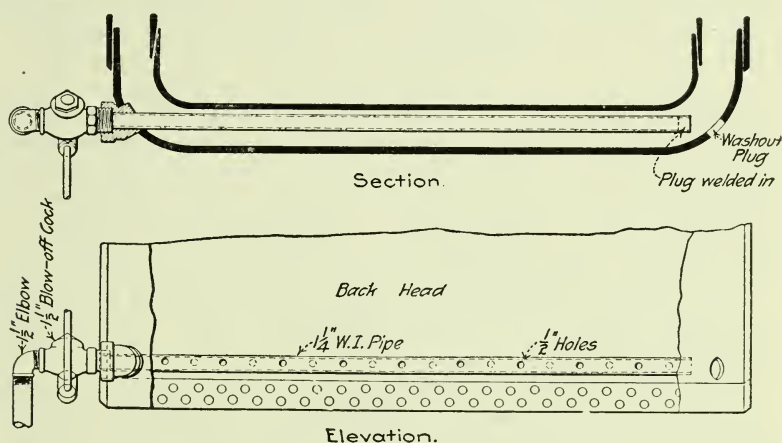


FIG. 4.--Blow-off Pipe in Back Water Leg.

THE CHAIRMAN: Prof. Breckenridge, may we hear from you on the subject?

PROF. L. P. BRECKENRIDGE (Univ. of Illinois): Mr. President, I feel that I ought not to say anything to the Western Railway Club on this subject.

I have long wished that we could have boilers with glass windows so that we could look in and actually observe some of the things that we guess are happening inside. Just how the water goes up or down the water legs of a locomotive fire box, is, I think we all agree, much in doubt, so that this particular question which you are discussing, the life of the fire box as affected by its shape, and the water circulation is difficult to discuss.

I should like to say a word about the matter of the transmission of heat through metals. It is a matter that has been given some attention in the last few years, and the Government tests referred to by the author of this paper have brought out some interesting results. These tests were made to determine the influence of the velocity of the hot gases over the surface as affecting the evaporation. It was found that a rapid increase in the circulation of the gases over the

heating surface of the boiler brought about a much higher evaporation per square foot of heating surface in a small boiler in which these tests were made.

We are not, I think, to assume that the evaporation per square foot of heating surface is really augmented by this increase in the velocity of the gases, except in so far as this velocity does have a certain sweeping action over the surface of the metal with which it comes in contact, which results in replacing the cold particles of the gases, which have become cold because they have transmitted their heat to the shell and into the water, by hotter gases which take their place, because of course it is true that the thing which determines the amount of heat which shall be transmitted to the square foot of heating surface is the cause of the temperature of the two sides at the surface.

In many experiments on heat transmission presented to us from time to time, it has been assumed, wrongly, I think, that the temperature of the sheet itself was at the temperature of the gases measured by a thermometer six or eight inches away from the sheet, and that the temperature of the other side of the sheet was at the temperature of the water which we hoped was in contact with the surface. In many instances these assumptions have been wrong, so that in this instance increased evaporation per square foot of heating surface has doubtless been brought about by making the hot side of the surface a great deal hotter than the actual temperature which existed before, when the gases circulated slowly.

I have always had the greatest respect for the locomotive fire box. I have always had the greatest admiration for the designers who have undertaken to solve the problem which presents itself in the construction and in the destruction of the locomotive fire box. There are few pieces of metal used in connection with boilers which have harder duties to perform than are found inside of the locomotive fire box, for reasons with which you are very well acquainted.

I have also had the greatest respect for the performance of a locomotive boiler, knowing the conditions under which it is operated, and I have concluded in the last few years that much of the good performance of a good locomotive boiler was due, in a measure at least, to the rapid, sweeping flow of the hot gases from the fire box to the front end.

We burn a very large amount of coal per square foot of grate area, and for every ton burned we discharge from sixteen to twenty-four tons of gas at a high velocity through the tubes. It seems to me that this sweeping action of the gas at the high velocity is one reason why the locomotive has performed as well as it has under conditions which certainly are not altogether best for economical performance.

While the high velocity of the gases on one side of the boiler plate or tube and the rapid circulation of the water on the other side may have considerable effect on this question of heat transmission, it occurs to me that the influence of the gas velocity will have a larger effect

than the influence of the velocity of the water, and in about the same proportion as the specific heat of the gas and the water. I believe you will find it more effective to increase the velocity of the gases than to increase the velocity of the water. The circulation of the water should, however, be made rapid as possible by any shapes, inclinations or well proportioned area that can be chosen.

We have had set up in our steam laboratory during the last four months a small apparatus which permits us to force water at varying velocities through a tube and transmit heat to the water from a constant source of supply. The experiments thus far indicate that there is advantage to be gained from a rapid circulation of the water, but our experiments have not yet been carried on with any such high temperatures as are found in the locomotive fire box. It is clearly evident that any boiler which is to give the maximum rate of heat transmission through the surfaces, the greatest capacity and perhaps therefore the highest commercial efficiency will be the one that has a very high gas velocity passing over the surface on one side of the plate and a high water velocity passing over the surface on the other side. A very large part of the heat that goes into the water of a locomotive goes in directly by radiation to the plates of the firebox, and the above remarks have no bearing upon this part of the heat transmitted.

MR. DE VOY: May I ask just one question, because I am very much interested in this? I understand all parts of Prof. Breckenridge's remarks, with the exception of his way of taking the temperature inside the fire box by means of any gauge known. The reason I say that, and I ask merely for information, for the reason that it is about fifteen years ago a test was made by the Superintendent of Motive Power of the West Shore, who was at that time chairman of the Master Mechanics' Committee on boilers. He sent me to Dr. Thurston of Cornell University, and he told me the only way he knew was to take a dozen or more fire bricks, about that shape (indicating), throw them in the fire box, pull them out and drop them into a tank of water, which we did. Now, I have heard of measuring the temperature, say 18 inches above the grate on the outside of the fire, inside of the fire box, but I do not know of any way it can be done, and I would like to be put straight on that, because I do not believe Prof. Breckenridge referred to it.

PROF. BRECKENRIDGE: The answer would take a long reply, and I suspect we cannot take time for it this evening. The art of measuring temperature has advanced in the last fifteen years a great deal and we now undertake to measure with a satisfactory degree of accuracy any temperature which can be produced by the burning of fuel up to 4,000 degrees, Fahr. The optical pyrometer is now successfully used for measuring temperatures in fire boxes and furnaces of all kinds. The construction and operation of these instruments is something I cannot go into at this time. An article entitled Practical Pyrometry by Mr. Robert S. Whipple, in the Journal of the Western Society of

Engineers for April, 1907, contains much of interest in connection with this subject.

THE CHAIRMAN: Mr. Manchester, may we hear from you?

MR. A. E. MANCHESTER (C. M. & St. P. Ry.): The subject of boiler construction is always a prolific theme with motive power people; but I feel more like listening than I do like talking tonight. I am in about the same position as was the son of General Prentiss. In his lecture on the battle of Pittsburgh Landing, General Prentiss tells the following story: His boy, fifteen years of age, was along with them and when the battle began, the boy drifted away from the division and late in the afternoon was found by a friend near the landing, or as far from the firing line as he could get. He was asked: "Johnnie, what are you doing here? Why are you not down at the front along with your father?" His answer was: "Not much, there is enough of our family down there now." (Laughter.)

MR. DE VOY: I don't know whether the boss is joshing me or not, but it is all right. He has 250 of those boilers in service, and a man's actions speak louder than words.

THE CHAIRMAN: Mr. Kilpatrick, have you something to say on this subject?

MR. J. B. KILPATRICK (C. R. I. & P. Ry.): I do not know that I have anything particular to say on the subject, as far as the type of boiler shown on the blue print is concerned, because I know very little about it. The road with which I am connected does not use it. I think a great deal of the trouble in fire boxes is due to the abuse of the metal, as well as the quality of the metal. The gentleman spoke about fire boxes cracking in the shop. I have known of fire boxes cracking forty-eight hours after the boiler was cooled. I think it is true that these cracks develop from the severe service to which fire boxes are subjected.

THE CHAIRMAN: Mr. Webb, this is a subject in which I think you are interested.

MR. E. W. WEBB (Mich. Cent. R. R.): I do not remember of a fire box cracking out on the road. I was on an engine for about twenty-one years and since then have gone into the shop. My experience is that they crack in the shop. It was only recently that on making inquiry in regard to a certain engine that had been held in for repairs it was found that the fire box side sheet was cracked; it did not crack on the road, that is very certain, it cracked in the shop.

Our experience with the wide fire box engines is very much the same as that on other roads, except that our flue mileage in the wide fire box is very good; it runs way up into the hundred thousand miles on the Pacific engine; the Atlantic type engine very much the same. The Pacific engines are better on flues than the Atlantic type, the Pacific engine flues running twenty-one feet, while the Atlantic are considerably shorter. About the water in the fire box—washing the boilers, of course we are all familiar with the necessity of that. I

do not know that we have any engines in service with side sheets inclined the same as those shown on the blue print: at least, not to my knowledge.

THE CHAIRMAN: Is there any further discussion on the subject?

MR. W. C. SQUIRE: I would like to ask Mr. De Voy whether the side sheets of engines on his road crack in service, and also to ask Mr. Wickhorst in reference to the exact location of their locomotives when their side sheets break, that is, whether those cracks develop in the shop or when the engine is in service. Any of the gentlemen present who have had experience, and this includes Mr. De Voy and Mr. Wickhorst, in testing and inspecting metals know that sheets which break or crack as side sheets do, develop a crack that is exactly like that which is due more particularly to localized heating, because those cracks show a fracture such as is developed when we bend a piece of steel that indicates from such test "hot shortness." From all cracked sheets that I have seen the fracture indicated the nature of the break to be due to this same class of heat treatment. It is no doubt true that the audible report of a side sheet parting at the fracture is often heard when engines are laid up in the shop and boilers are cold, but I still believe that the crack was incipient or developed while the engine was in service and not while in the shop; in other words the coherence of the metal was destroyed in service but there are local stresses set up in the sheets as the boiler becomes cold that cause the defective sheets to part, but the incipient parting or fracture was developed under service conditions, namely when the engine was working and fire was in the fire box.

MR. DE VOY: Am I supposed to answer that, Mr. Chairman?

THE CHAIRMAN: You may, yes, Mr. De Voy.

MR. DE VOY: All the cracks I have ever seen made in the fire box start about a quarter of an inch away from the staybolt. You examine a crack in any fire box and you will find that is about the way it is. I know of three cases, one was on an engine in service and the crack was so large that it put the fire out at that particular time and killed the engine. One thing I cannot understand is, what will crack a fire box forty-eight hours after it is inside the shop. That appears to be worse than my own theory anyhow. You have got to show me. I realize just as well as anybody that there is not anybody who has built a boiler just like that, and I do say we have to put up with a good many stresses, but anyway, it is not theory, it is absolute practice.

THE CHAIRMAN: One of the older members, who has been in this business for a long, long time, we have not heard from in the Western Railway Club recently, and I would like to hear from him tonight, Mr. Cory.

MR. C. H. CORY: I think you will have to place me as a back number, having been out of railway service now for several years, and not up to date in this matter of new form of boiler furnace, this

being my first introduction to it. I can recollect several years ago at one of our conventions—I cannot call to mind exactly who was on the Committee on Boilers and Furnaces, but one of the parties was Mr. Samuel J. Hayes, then Superintendent Motive Power of the Illinois Central Railroad Company. This committee made tests of the water circulations in the leg of boiler by inserting a gauge or test cock in the outside sheet of the furnace and screwed it through until it struck the inside sheet. The usual boiler pressure at that time was not to exceed 150 pounds. This gauge or test cock was screwed in the outside sheet about where the hottest part of the fire would strike the sheet on the inside. After they had unscrewed that gauge enough to break away from the inside sheet they found the intense heat on the inside of the furnace forced the water from the inside sheet and they would draw steam instead of water from the test gauge and, if my recollections serve me right, before they could get a solid body of water the inside end of the gauge was three-eighths of an inch away from the inside sheet. Perhaps some of the other members of the Association can remember as far back as that and perhaps not, but I have always remembered the report that was made at the time in connection with the operation and flow of water in the leg of boiler. I think the intense heat in the inside of the furnace would drive the water away from the inside sheet so that they would not get water until they got three-eighths of an inch away from it. I think that had a great deal to do with the overheating of the sheet, causing cracks, etc. I never knew of a sheet cracking in service on the road; the cracking of the fire box sheet was always in the shop. I have heard them crack with the report of a rifle, after the engines have come in perfectly tight and had no defects of the furnace that we knew of. They would usually crack from one staybolt to another and sometimes extend 20, 24 and 28 inches long. My experience is that it always occurred when the engine was cold and at rest in the shop.

THE CHAIRMAN: Is there any further discussion before we call on Mr. Seley to close this paper?

MR. F. D. FENN (The Crane Co.): I would like to be permitted to ask a question in connection with the statements Mr. Wickhorst made. I would like to ask Mr. Seley, Mr. De Voy, Mr. Wickhorst or Prof. Breckenridge where in their opinion is the best place in that boiler to locate the blow-off cock? Mr. Wickhorst made the statement that the mud accumulated in the back corners. I would like to know if he would recommend that as the best place to put the blow-off cock to relieve that situation?

THE CHAIRMAN: Will one of the gentlemen answer that question?

MR. WICKHORST: I might say that it is a matter to which I have given a great deal of attention. Our practice on the C. B. & Q. is to put a perforated pipe across the back mud ring and attach a blow-off cock in the corner. On some of our smaller engines we use only a blow-

off cock, which is put on the back sheet under the fire door down at the mud ring.

THE CHAIRMAN: If there is no further discussion, we will call upon Mr. Seley to close the discussion on his paper.

MR. SELEY: Mr. Chairman, I think I have attained my object in getting a discussion on this rather interesting question. I do not know that our friend De Voy and myself differ very much; he did not worry my bubble theory very much, and I agree with his sloping the sheets, so that we will probably go off friendly.

The idea that I had in mind was simply to find some reason why, if the proposition is correct, that the modern wide fire boxes are lasting one-third of the life of the old time boxes. In seeking for a theory, it occurred to me to consider those elements which contribute to ultimate failure, viz.: the vibrations or the expansions and contractions or movements of the sheet in the performance of its duty. I do not know that I am right yet, not at all sure that I am, but at the same time, if there is successful performance of fire boxes about sixty inches wide, and boxes wider than that have not given as good performance, would indicate that the slope of the sheet due to the narrower width had something to do with it. Now, just how that works out: whether I am correct in supposing that that upward circulation against an outwardly inclined sheet assists in wiping off the steam bubbles and combining them with the current, transmitting the heat, warming up the entire body of water in the water leg, instead of permitting a curtain or film of steam which will contribute to overheating of the sheet, it at least seems to be a reasonable theory or explanation with some foundation for it.

Whether Mr. Lawford Fry's theory of downward circulation or mine of facilitating wiping action of the circulation are used, the result is the same as regards the desirability of outward instead of inward inclination of fire box side sheets.

As regards Mr. Squire's inquiry about the solid water, it would seem to me that there is absolutely no possibility of a steam bubble combining with another and another and another until there is a film on any portion of the crown sheet, which is considerably beyond the vertical. Now, if the incline of the sheet was inward instead of outward, it would seem to me as though it would be more favorable for the formation of the steam film, as the effect of the circulation would have no scrubbing or wiping effect on that sheet, but if there is an incline outward, that upward rising tendency gives a wiping effect. Now, if the volume of the water leg is increased by greater width of water leg, I think it is reasonably sure that the rate of the circulation as a whole is decreased, due to that larger volume, and if the rate of circulation is a factor in keeping down the internal temperature of that sheet, the failures are in accord with my theory.

What I am trying to find out is this,—you will probably all admit that a fire box sheet has a certain life, it will stand so many vibra-

tions, so many expansions, so many contractions, from the normal, and then it will develop that crack that goes off like a pistol shot, or some other way, but at any rate there is a failure of the sheet. Now, if that is the cause, if we can lengthen out the period of time over which that amount of travel will happen, we get the increased life in our sheet. It seems to me that if the box is designed in such a way that the internal temperature of the sheet is kept down by keeping solid water against it by any means whatsoever, then with all of the fire boxes, even with the despised O. G., we have made a distinct gain. I think that this is a matter to think about and possibly to go into our records, to classify the fire boxes of different widths and angles and forms, and go back through our records for years and find out the number of fire boxes and side sheets that have been applied and see what results we obtain. I do not believe that it is due to the quality of fire box steel falling down necessarily; I think it is perhaps a matter of design.

As regards Mr. Wickhorst's belief that there is no downward circulation, or at least that there does not seem to be much to support that theory, I agree with that in a great measure. My idea of the circulation is that it is very rapid, upward, against the inside sheet and less rapid at the outside, so that a number of inclined lines, each of a greater angle, would express the velocity as I understand it. But I can hardly understand why water up at two-thirds of the height of the fire box against the outside sheet should come down. I cannot see why it will not rise, although at a very less rate than that of water that is close to the fire box sheet.

I think the paper has served its purpose, Mr. Chairman, and I am very glad to have had the interest of those who have taken part in the discussion.

MR. DE VOY: Before the meeting is closed,—I presume it is now about eleven o'clock, which shows the interest that has been taken in the discussion—I move that the club tender a vote of thanks to Mr. Hennessey and to Mr. Seley for the papers which they have given us tonight. They have been very interesting and I think our thanks are certainly due to both the gentlemen referred to.

The motion was seconded by Mr. Squire and carried, after which the meeting adjourned.

The David L. Barnes Library

SPECIAL NOTICE.

The David L. Barnes Library of this Club, at 390 Old Colony Bldg., Chicago, is open for the use of members and their friends, and we hope it will be used freely. It is open on week days from 9 a. m. to 5:30 p. m., except on Saturday, until 3 p. m. Books must not be removed from Library, but the Librarian will assist visitors in finding information and will promptly reply to letters from out-of-town members desiring information from the Library. Donations of books and technical publications will be gratefully received.

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OFFICIAL PROCEEDINGS OF THE WESTERN RAILWAY CLUB

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Incorporated March, 1897

Library, 390 Old Colony Bldg.

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The regular monthly meeting of the Western Railway Club was held at the Auditorium Hotel on Tuesday evening, January 19, 1909, President M. K. Barnum in the chair. The meeting was called to order at 8 P. M. Of those present, the following registered:

Adams, H. C.
Albert, C. J.
Allen, G. F.
Anderson, A.
Angell, F. R.
Angier, F. J.
Arlein, E. J.
Axtell, G. F.
Ayers, A. R.
Barnard, H.
Barnes, Chas.
Barnes, Chas.
Barnum, M. K.
Balknap, R. E.
Benjamin, F. G.
Blatchford, Carter
Bowman, A. A.
Bradley, W. H.
Brown, J. L.
Brown, L. H.
Brown, R. L.
Bourne, G. L.
Callahan, J. P.
Carlton, L. M.
Clark, R. B., Jr.
Connelly, W. L.
Cooledge, F. J.
Cooke, W. J.
Cram, T. B.
Curtis, J. J.
Derby, W. A.
DeVoy, J. F.
Dewar, John

Dinsmore, C. L.
Drennan, W. M.
Dunham, W. E.
Ensign, H. W.
Etten, L.
Ewing, C. J.
Faragher, R. S.
Fogg, J. W.
Fromm, A. B.
Geer, R. B.
Harkness, F. L.
Haney, W. J.
Henderson, T. D.
Hildreth, F. F.
Hill, C. P.
Hodgkins, E. W.
Hopkins, G. H.
Hopkins, L. R.
Hunter, Percival
Jenks, C. D.
Jennings, D. F.
Johnson, Wallace
Jones, E. F.
Jones, L. E.
Kelley, H. D.
Kilpatrick, J. B.
King, C. H.
Kipp, A. R.
Kucher, T. N.
LaRue, H.
Lewis, J. H.
Lickey, T. G.
Lovell, C. P.

McAlpine, A. R.
McAuliffe, E.
McCormick, A.
Mahn, J. T.
Maus, N. R.
Meeder, W. R.
Mercur, H. D.
Mirtz, P. P.
Miller, Wm.
Monroe, M. S.
Moulton, W. B.
Motherwell, J. W.
Murphy, J. P.
Nathan, C. A.
Neely, B. J.
Parsons, Otis
Peck, C. S.
Peck, P. H.
Peterson, F. W.
Ricketson, W. E.
Robb, J. M.
Robinson, J. G.
Rowley, S. T.
Royal, Geo.
Ryan, Henry
Ryder, G. E.
Schoenthaler, Marshall
Schroder, H. F.
Slater, F.
Seyfarth, E. E.
Sharp, W. E.
Scheffer, A. M.
Sherman, L. B.

Simons, J. E.	Stimson, O. M.	Webb, E. R.
Sylvester, F. L.	Sturgis, R.	White, J. L.
Smith, W. R.	Symons, W. E.	Winslow, H. L.
Smith, Robt.	Taylor, J. W.	Willecoxson, W. G.
Snead, J. M.	Tawse, W. G.	Wright, Wm.
Squire, F. G.	Thurnauer, G.	Wolfe, Chas.
Squire, W. C.	Towsley, C. A.	Woods, E. S.
State, R. E.	Wallace, W. G.	Zealand, T. H.
Stubb, F. W.		

THE PRESIDENT: Gentlemen, please come to order. The minutes of the last meeting have been printed and distributed and if there are no objections or corrections, they will stand approved.

We will now hear the report of the Secretary.

THE SECRETARY: I have the usual membership statement.

New Members

Name.	Occupation.	Address.	Proposed by
Charles Schenck, Supt. Car Shops, Chicago Rys. Co., Chicago.	J. Z. Murphy		
A. I. Totten, Power & Mining Dept. General Electric Co., Schenectady, N. Y.	C. A. Seley		
Maj. Charles Hine, Railway Examiner, Vienna, Va.	W. E. Symons		
W. F. Whittingham, Inspector, C. & N. W. Ry., Chicago.	C. A. Schroyer		
Edgar Gardner, Ward Packer Supply Co., Chicago.	C. L. Buckingham		
David N. Bigelow, National Dump Car Co., Chicago.	F. C. Cameron		
W. T. Van Dorn, W. T. Van Dorn Co., Chicago.	T. L. Dodd		
J. S. Seeley, Nathan Mfg. Co., Chicago.	Sanford Keeler		
P. W. Wendt, Steel Car Forge Co., Chicago.	W. A. Libkeman		
R. C. Forbes, Browning Engineering Co., Chicago.	J. W. Taylor		
L. Etten, Illinois Northern Ry., Chicago.	M. J. Kelley		
Geo. F. Allen, Ry. Materials Co., Chicago.	T. B. Cram		
H. T. Mercur, Ry. Materials Co., Chicago.	T. B. Cram		
W. E. Ricketson, Spec. App., L. S. & M. S. Ry., Elkhart, Ind.	A. R. Ayers		
H. W. Marsh, Trav. M. M., C. G. W. Ry., Chicago.	F. C. Fosdick		
H. E. Reisman, Ed., R. I. Employes Magazine, Chicago.	J. T. Maher		
S. F. Denny, Revere Rubber Co., Chicago.	G. M. Crownover		
Harry Ryan, Engineer, C. & W. I. R. R., Chicago.	J. T. Bronson		
W. W. Johnson, G. M., Standard Magnesia Co., Franklin, Pa.	W. E. Symons		
C. H. Polley, C. C., Osterman Mfg. Co., Chicago.	W. M. Drennan		
W. Anderson, A. G. M., Osterman Mfg. Co., Chicago.	W. M. Drennan		
H. F. Maxwell, Inspector, C. & N. W. Ry., Chicago.	C. H. Osborn		
F. L. Sylvester, Asst. C. C., C. & E. I. R. R., Chicago.	A. A. Bowman		
W. J. Haney, Asst. Agt., C. & E. I. R. R., Dolton, Ill.	A. A. Bowman		
S. Madson, Car Foreman, C. G. W. Ry., Oak Park, Ill.	H. W. Ensign		
H. A. Milligan, Train Master, C. L. S. & E. Ry., Gary, Ind.	J. P. Callahan		
J. L. Ponie, J. B. Clow & Son, Chicago.	A. J. Odegard		
O. L. Dickinson, Spec. Insp. of Trans., C. B. & Q. Ry., Chicago.	M. K. Barnum		

Resignations

A. W. Sullivan	C. M. Muchnic	S. W. McMunn	Wm. Snodgrass
J. M. Snodgrass	N. B. Pennock	J. A. Haley	A. M. Smith
R. B. Fulks	L. V. Dabrowski	E. W. Farnham	H. C. Johnstone
Ira C. Hubbell	T. E. Warnock	G. W. Wheeler	Hugh Bartlett
F. W. Coale	Benjamin McKeen	C. R. Allison	

Membership December, 1908	1528
New members approved by Board of Directors	28
Resignations	19
	9
Total membership	1537

I would like to say at this time that the subject of the paper for the February meeting will be on the mineral analyses of surface waters used in the Middle States. The Water Resources Branch of the United States Geological Survey has been making a series of analyses all over the United States, and their chemist has agreed to prepare a paper, limiting the observations to the Middle and Western States through which the roads centering in Chicago run. It will be illustrated by stereopticon views and will be an interesting paper.

THE PRESIDENT: The paper for the evening is entitled "The Purchase of Railway Fuel Coal." It will be presented by Mr. Eugene McAuliffe, General Fuel Agent, Rock Island-Frisco Lines. Gentlemen, I have the pleasure of presenting Mr. McAuliffe.

THE PURCHASE OF RAILWAY FUEL COAL.

BY MR. EUGENE MCAULIFFE, GENERAL FUEL AGENT, ROCK ISLAND-FRISCO LINES.

The purchase of railway fuel coal is an important item, but after all a comparatively easy one; getting the right grade, at the right time with the right weight, and securing empty cars to load are, at times, more difficult problems.

There is plenty of coal, too much in fact; the mines do not work as regular as they should and as a result neither mines or miners can be depended on to work with mechanical smoothness. Habit is everything, and while the mines are idle waiting for men, cars, orders, repairs, or some one of the thousand other things that shut mines down, the railroads go on burning coal. Of late you would think that a secret service department was a necessity in order to keep up with prospective shut-downs, the causes ranging from the size of the bit used in boring shot holes, up through the item of supplying a grade of powder that does not suit, the color of a new pit mule, etc. "Shut her down" is the sovereign remedy for the coal miners' ailments, and no other business on earth seems to suffer to the same extent from this uncertainty.

The officers of the Miners' Union, generally, appreciate this condition and they are struggling with it, but the polyglot races that go to make up the mine workers have at times conflicting views, and so they "stop her." For the man to whom it is up to, to get the stuff there are two remedies, eternal watchfulness or a large stock, and the last is an expensive luxury, tying up as it does capital and equipment, the coal cars blocking the yards, the coal subject to deterioration and

theft, the railroad paying 5 per cent on the money tied up in the stock.

Every two years it is the fashion for the miners to take a ten weeks vacation; the next one is due March 31st, 1910, and a couple of months before that we all get busy, the miner getting out double the usual quantity of coal to tide the consumer over the strike period. That, however, is not his intention; he works for money to tide himself and family over, but the result is the same. The real loser is the consumer, the loss to railroads storing coal, including labor, depreciation of coal with consequent increase in operating expense, per diem, on cars and inconvenience to regular business easily equal to forty or fifty cents per ton. When the Spring fishing season is over, the stock piles exhausted, it is "back to the mines" and forgetfulness.

Here I wish to ask you a question: Can we not avoid this bi-ennial shut down and prevent this waste of energy and material? If the two parties to the conflict, employer and employee, cannot get together without assistance, cannot such be rendered in the shape of a National Arbitration Committee with a conciliation law like that now in force in Canada, the miners to go on producing coal to meet the requirements in the mean time? This is a live question and one the railroads are interested in.

The money and labor spent by the railroads in getting ready for these shut downs, not including that used in cleaning up idle mines at the end of the shut down period, would pay for side tracks, shop extensions, track scales and other betterments required by the average railroad to properly serve its patrons.

Remember, these differences which of late have come at two year intervals do not reach the proportions of a strike; they are stoppages of production only, and they take place with automatic precision at 4 p. m. of March 31st, if that date does not fall on Sunday, in which case 4 p. m. of March 30th is the time.

The coal miner knows when he works with extra force in February and March that his labor is being piled up to defeat him, but that makes no difference; he cleans up his room the last day, sends up his tools and goes home to wait. In the meantime the Convention Hall at Indianapolis echoes to flights of oratory which is principally of the four-flushing variety; intellectual giants on both the miners' and the operators' sides thresh the air, while the railroad fuel departments are wearing the life out of the division forces to unload coal, to waste and deteriorate from handling and the elements. The orators mean to be honest, but it is time for the consumer to demand that a scale and condition that can be used for twenty-two months be continued in force until a new agreement is made; continuity of service pending the making of a new wage agreement is just as essential on the part of the coal miner as it is on the part of the locomotive engineer, when practically one hundred per cent of the men employed act as they do in a concerted manner through the medium of their organization.

I opened this paper with a statement; most papers contain figures. I will make use of but one example. I said that the volume of railroad fuel coal used in the United States annually assumes large proportions. It equalled in 1907, 115,000,000 tons, or 2,875,000 car loads of 40-ton capacity, which set end to end counting 40 feet to the car, the "Cut" would be 21,780 miles long. The day's consumption equals 7,876 cars, or a string 60 miles long. The railroads burned about 24 per cent of the total coal mined in the United States in 1907. These are the only figures I will make use of.

Buying coal is a business; so is buying anything else. The man who studies his dress and looks carefully into his purchases usually appears best. If he is a smoker and he buys his own cigars, he smokes a better grade than he would if he left the matter to his wife to attend to. I mention these things with the view of suggesting that buying coal should be studied, and made somebody's business, and railroads should pay cash for their coal and not try to pay part cash and part cars, as it has been charged was the practice a few years ago on certain roads.

Fuel contracts should not be given as a reward for commercial tonnage. When you get the contractor's tonnage you are liable to lose that of his competitor; they both pay the same rates of freight. Quality and price coupled with reliability of delivery are the conditions that should govern.

Dividing contract tonnage on a percentage basis is not a good thing either. It eliminates all competition as to price and grade. No man should have a cinch on anything in this world except health and family; keep him hustling for the rest and you are helping him most. When you do make contracts keep in touch with your contractor; know him, if he shirks lose him when the time comes, tying to those who tie to you. If one of your contractors suffers bad luck and cannot meet his tonnage obligation, reduce the pressure and levy a little heavier on the others. When he in turn is riding the tidal wave you can even up. If your contractor is on your rails you will find at times that he has problems and you can well afford to help meet them if he is the kind of a man you want to do business with. This again suggests specialization. Somebody must make fuel purchasing his business. The empty car is always a live issue. Paradoxical as it may seem, coal car shortages on a railroad always go hand in hand with coal shortages; plenty of coal, plenty of cars, but this is not an argument for tying up cars. The man who is responsible for the coal supply should, at least, be on speaking terms with the man who distributes the cars; they should keep in close touch and thus together work out many problems that will tend to economy.

The buyer usually has a close acquaintance with both the coal and the railroad operating man. That makes it possible for him to act as a go-between, and he can, if he will, do much through a force of competent inspectors to secure a maximum loading of cars as well as

the proper disposition of foreign equipment. The fuel man, if he handles the invoices, can do much to smooth the path of the freight claim agent in settling claims and finding a disposition for refused coal. These gentlemen should also nod when they meet in the elevator.

The Mechanical and the Fuel Departments should hold a close relation to each other. When an engine crew has lost time or set out tonnage, charging it to the coal suggests the line of least resistance, besides the coal does not talk back; it is not there to do so. That does not mean that we do not get bad coal; it frequently comes good today, and tomorrow things at a certain mine go to the bad. Some of the worst coal I ever saw went over the screens when an inspector, or perhaps the superintendent was watching it. Somehow coal miners expect you to kick and when you do not they think that they can relax, and gradually the standard lowers till the battle cry is sounded, when they take a fresh hold. The best inspection is that which can command on the part of the inspector the whole force of the producers' organization to the end that good coal will be produced.

I do not believe it is the proper thing for the purchaser to employ men to stand around coal mines all day looking at the coal that goes into the car. That means that the buyer is furnishing superintendence that the seller should provide and pay for. There is a disposition on the part of the producer to lean on the railroad fuel inspector. I have often been asked to put my complaint in writing "so we can show it to the men". This is a plain confession that the job is too big for the mine superintendent, and he should be braced up to the extent of being forced to run his own business or else he should be relieved. There should be but one head to a coal business and the fuel inspector should not be a necessity, at least as far as exacting contract grade of fuel is concerned. Personally I intend gradually withdrawing the inspectors in my department from the mines and instead put them on work that the railroad company should look after. The purchase side as well as the selling side of the coal business calls for the application of honest principles. There is no difference between the seller who shirks his contract obligation in order to gain temporarily a few cents a ton, and the buyer who takes advantage of a hard luck market to scalp ten cents a ton on a few car loads of coal. When a railroad fuel purchasing agent finds it necessary to relieve an industry that is out of coal, do so, by charging it the regular commercial freight rate as the law requires, turning the coal over to the coal company which produced it, exacting a credit memo for amount paid, letting the coal company invoice direct. If you have to take a few cars of outside coal off the hands of some shipper, pay him what your contract price will stand, grade and freight charges considered, collecting car service again as the law and the published tariffs demand. The liveliest item in the coal line today is the question of car lot weights, both empty and loaded. There is very little dishonesty practiced in the handling of weights of carlot coal, but there are many inaccuracies. One car has

an overweight, the next one an underweight, the gentleman who gets good measure does not complain, he who suffers the shortage howls. Let us all, coal operators, selling agents and consumers, be frank and agree that the fifty-ton coal car loaded gross to as much as 156,000 pounds, calls for jam up track scales, well set, maintained, and handled. We should get together on this and handle the question in a business-like way and quit talking about it.

The producing railroad should carry a correct tare weight on its cars, weigh the commodity and weigh it right. Weight is a factor equal in importance to that of the rate, when figuring the freight on a car of coal. Every railroad having a mileage warranting same should have a weighing bureau with a competent man in charge of same. When the railroad is properly equipped to weigh carlot freight it should do the work and then as a carrier stand behind its own figures. Due consideration should be given to what can be classed as legitimate shrinkage of coal weights, particularly that due to the evaporation of contained moisture.

It may not be improper to say here that with coal cars equipped with the vertical plane coupler, maintained to the standard height as required by law, weights can be accurately obtained without uncoupling at either end.

I have demonstrated this by a dozen separate tests including several hundred cars, and as a result of these investigations, personally made, I stand committed to the belief that cars when cut at one end can be weighed with accuracy providing they are stopped on the scale, this position insuring correct weights, with the minimum expenditure of time and expense.

This is not a scholarly paper and it does not even attempt to exhaust the subject. If it provokes any discussion of the matter on the part of those more competent to handle same, I will have accomplished something.

THE PRESIDENT: Gentlemen, the paper is now open for discussion. Mr. Symons, will you kindly give us your views on this paper, to start the discussion?

MR. W. E. SYMONS (Consulting Engineer): Mr. President and Gentlemen of the Western Railway Club—Mr. McAuliffe has given us a very good paper, and aside from the direct information given, he has opened up a very wide field for discussion and argument, which doubtless will bring out some valuable information from others.

The first and one of the most interesting questions is that of quantity mentioned by the author on the first page of his paper, and as the term "*plenty*" is somewhat ambiguous in its general application, I will quote from the U. S. Bureau of Statistics on Mines and Mining as to present known quantity in square miles and tons, and the estimated time the supply will last at the present rate of consumption.

U. S. STATISTICS AND TABLE.

PRODUCTION OF COAL.

AREA OF THE WORLD'S COAL-FIELDS, IN SQUARE MILES.

China and Japan, 200,000; United States, 194,000; India, 35,000; Russia, 27,000; Great Britain, 9,000; Germany, 3,600; France, 1,800; Belgium, Spain, and other countries, 1,400. Total, 471,800.

The coal-fields of China, Japan, Great Britain, Germany, Russia, and India contain apparently 303,000,000,000 tons, which is enough for 450 years at present rate of consumption. If to the above be added the coal-fields in the United States, Canada, and other countries, the supply will be found ample for 1,000 years. Improved machinery has greatly increased the yield per miner, and thus produced a fall in price to the advantage of all industries.

The production of the principal countries in 1907 in metric tons of 2,205 pounds was: United States 430,430,183; United Kingdom, 267,828,276; Germany, (a) 205,542,688; Austria-Hungary, (a) 39,876,511; France, 37,022,556; Belgium, 23,824,499; Russia, 17,800,000; Japan, 12,890,000; Australasia, 10,534,000; India, 10,694,891; Canada, 10,510,961; Spain, (a) 3,250,000; Sweden, 305,308; So. Africa, (b) 3,945,043; Italy, (a) (b) 225,000; all other countries, (b) 3,475,780; total, partly estimated, 1,078,155,696 metric tons.

(a) Including lignite.

(b) Estimated.

STATES. Bituminous.	Tons.	VALUE AT MINE.		STATES. Bituminous.	Tons.	VALUE AT MINE.	
		Total.	Per Ton.			Total.	Per Ton.
Alabama.....	14,417,863	\$ 19,408,294	\$1.36	Tennessee.....	6,760,017	\$ 8,179,621	\$1.21
Arkansas.....	1,930,400	2,609,040	1.35	Texas.....	1,300,000	2,080,000	1.60
California.....	29,800	50,660	1.70	Utah.....	1,967,621	3,364,632	1.71
Colorado.....	10,920,527	15,179,533	1.39	Virginia.....	4,570,341	8,244,614	1.80
Geo. & Nor. Car..	365,300	423,748	1.16	Washington.....	3,713,824	7,427,648	2.00
Illinois.....	51,317,146	54,396,175	1.06	West Virginia.....	47,205,965	46,733,905	.99
Indiana.....	11,692,072	12,276,676	1.05	Wyoming.....	6,218,859	10,883,003	1.75
Ind. Territory....	3,450,000	6,486,000	1.88	Alaska & Nevada.	15,500	60,450	3.90
Iowa.....	7,568,424	11,882,426	1.57	Total Bituminous	\$ 388,222,868	\$ 662,307,994	\$1.20
Kansas.....	6,137,040	9,328,301	1.52	ANTHRACITE.			
Kentucky.....	10,207,060	11,431,907	1.12	Colorado.....	45,113	145,264	3.22
Maryland.....	5,529,663	6,617,354	1.20	New Mexico.....	17,000	64,000	3.80
Michigan.....	1,898,446	3,758,923	1.98	Pennsylvania.....	86,279,719	198,443,354	2.30
Missouri.....	4,350,000	6,916,500	1.69	Total Anthracite	\$ 86,341,832	\$ 198,653,218	\$2.30
Montana.....	1,810,000	3,348,500	1.85				
New Mexico.....	2,302,062	3,729,340	1.62	Total All Coal..	\$ 476,564,700	\$ 662,307,994	\$1.40
North Dakota....	268,300	563,430	2.10				
Ohio.....	32,465,949	35,712,244	1.10				
Oregon.....	51,600	141,900	2.75				
Pennsylvania.....	149,759,089	172,222,952	1.15				

(U. S. Bureau of Statistics, 1907—2,000 lb. Tons.)

It may be noted from the above table that, in the Mississippi Valley or more definitely speaking, in the states of Illinois, Indiana, Iowa, Kansas, Kentucky, and Ohio the production of coal last year amounted to a total of.....115,387,691 tons.
 With a value at the mine of\$145,025,000

STATISTICS OF STRIKERS AND LOCKOUTS.

The next subject reviewed by the author, the question of strikes and lockouts, is a very important one, and should be given more than usual attention. It is not only of interest to the railway companies and to the fuel agents, but it is of interest to every American citizen, the question of the yearly or biennial strikes of coal miners. I find by referring to the United States Bureau of Statistics on Labor, the twenty-first annual report of the Commission of Labor dealing with the subject of strikes and lockouts in the United States during the years 1881 to 1905 inclusive, a period of twenty-five years, they have a record of 36,757 strikes; establishments affected were 181,407; number of strikers 6,728,048; number of employes thrown out, 8,703,824. The number of lockouts during the same period were 1,546; establishments affected 18,546, employes locked out 716, 231; number of employes thrown out of work, 825,610; total number of men affected 16,973,713.

The coal and coke industries were second in importance so far as the number of strikes and establishments were concerned, but first in number of strikers and employes thrown out of work.

In the coal and coke industries there were 3,336 strikes, affecting 17,025 establishments; involving 2,006,353 strikers and 2,460,743 employes thrown out of work.

The average duration of strikes varied from 4.6 to 83.2 days in ore and mining, while the average for coal and coke was 50.9 days.

Another interesting feature of the report is the one showing per cent of establishments involved, which were closed by strikes. This means the percentage of the establishments pertaining to a certain fixed industry in which strikers were involved. The percentages varied from 9.72 in slaughtering houses and meat packing to 96.71 per cent in coal and coke, from which it is to be seen that when the coal and coke miners strike, they close up everything in the way of coal production. The coal and coke industry has suffered more from the result of labor troubles than any other industry in the country and when it is considered in connection with this enormous loss, that the railway companies and many other industries are affected in like manner, additional emphasis is given to the author's suggestions, that some means be provided whereby the differences between the miners and their employes should be adjusted without the possibility of their annual or semi-annual strikes pending a revision of the wage scale in which many of the greatest sufferers from the miners' strike

are in no wise interested, and, as the author has well said, there is no more reason why these men should stop work pending the revision of a wage scale than there should be for all the locomotive engineers, firemen, brakemen, shopmen, conductors and switchmen to stop work and put all the railway companies in America out of business while the officers and the organizations involved were discussing wage schedules of the railway company, and if the respective representatives of the interests involved cannot find some means of a peaceful solution, then the matter should be taken in hand by the State and National authorities, to the end that a proper supply of coal should be at all times mined and delivered to the surface of the ground for consumption, and at the same time guarantee continuous employment at reasonable wages to the miner, and as high a degree of protection from injury as human ingenuity can devise.

There has been some progress made in this direction in the way of settling strikes by arbitration, as will be shown by the following table (also from the National Commission of Labor). During the five year period of 1901 to 1905, there were 14,964 strikes, of which 803 were settled by agreement, and 223 by arbitration: the percentages being 5.7 and 1.6 respectively. Of lockouts there were 541, 66 being settled by agreement and 11 by arbitration, showing that some little progress has been made in the direction of a more peaceful solution of the coal miners troubles with their employers.

STRIKES AND LOCKOUTS SETTLED BY JOINT AGREEMENT AND ARBITRATION.
(1901 TO 1905)

Year	STRIKES.			LOCKOUTS.		
	Number.	No. Settled by Joint Agreement.	No. Settled by Arbitration.	Number.	No. Settled by Joint Agreement.	No. Settled by Arbitration.
1901	2,924	149	49	88	10	2
1902	3,162	204	58	78	11	1
1903	3,494	246	66	154	18	3
1904	2,307	130	23	112	17	2
1905	2,077	74	27	119	10	3
Total...	13,964	803	223	541	66	11

Of the strikes there were 803 or 5.7 per cent settled by joint agreement, and 223 or 1.6 per cent settled by arbitration. Of the lockouts 541 there were in number of which 66 or 12.2 per cent were settled by joint agreement, and 11 or 2 per cent by arbitration.

WEATHERING OF COAL, DETERIORATION.

The next feature of the author's paper is with respect to the deterioration of coal. This is a very important matter and I am inclined

to think that it not infrequently amounts to a great deal more in dollars and cents than is ordinarily supposed. This for the reason that a given quantity of coal mined and placed in storage at any point will frequently measure somewhere approximately near to what it represented originally in cubic contents, but while in storage a large portion of its strength, or heating value is lost, it having deteriorated by the action of the elements.

The Engineering Department of the University of Illinois compiled some figures on this matter, to which I will refer in my remarks on the subject. The storing of coal is, as the author has well said, becoming more and more necessary in practice, and the question of deterioration enters as a very vital factor in the case. That such deterioration will occur is conceded by all, but exact data as to the extent or information as to the conditions which retard or promote it are meagre. Storage plants with capacities ranging from 50,000 to 150,000 tons and in some instances much larger are becoming frequent. Each one per cent of deterioration in the storage heap of the smaller size represents a loss of heating value equivalent to 500 tons of coal, while a loss of 8 per cent on the larger heap represents a loss of heating value equivalent to 12,000 tons of coal, while, as a matter of fact in cubic capacity, or the weight of the heap of coal, would be approximately the same as when it was purchased and placed there in storage; consequently the Motive Power Department of a railway, would be expected, as a rule, to get the same results from this pile of coal, which had shrunk in heating value 12,000 tons as though it had been given them for use on the day it was purchased, from which it is very plain that the question of deterioration of coal is a much greater item than it is ordinarily recognized to be.

The summary of the findings of the committee appointed and working under the auspices of the University of Illinois with reference to deterioration of coal is as follows:

(1) Submerged coal does not lose appreciably in heat value.

We must consider in connection with this matter, and doubtless the author will concur in my views, that it will be almost impossible for railroad companies to submerge storage coal.

(2) Outdoor exposure results in a loss of heating value, varying from 2 to 8 per cent.

(3) Dry storage has no advantage over storage in the open, except with high sulphur coals, where the high disintegrating effect of sulphur in the process of oxidation facilitates the escape of hydrocarbons or the oxidation of the same.

(4) In most cases the losses in storage appear to be practically complete at the end of five months. This of course is the result of laboratory tests, while, as a matter of fact, with certain coals and under certain climatic conditions the deterioration continues over a much longer period and to a much greater extent than is reported.

From the above it is very clear that as the author says the deterioration of coals mined and stored in large quantities in anticipation of strikes results in a great financial loss.

On the question of quality, while the author in his paper does not lay as great stress on the necessity of inspectors as some do, and as I had rather supposed he would, yet I am inclined to think that he himself fully appreciates the necessity of a rather close inspection of coal.

QUALITY OF COAL, CHEMICAL ANALYSIS.

I find on looking over certain well known authorities who have analyzed coal, that the chemical composition of coal varies so much that it gives a wide range of values. Assuming that a ton of coal properly interpreted means 14,000 units of heat, then it follows that at \$2.00 per ton, the cost of the source of the motive power of a railroad using such coal is on the basis of 70 units of heat, for each one cent, and if coal is furnished with only 10,000 heat units per pound, then there is an actual loss to the company in the price of fuel of 28½ per cent, to say nothing of other losses due to train delays, overtime of trains, increased boiler repairs, etc.

It goes without saying that no railroad company would tolerate the second offense of similar importance, in the purchase of other supplies, such as ties, lumber, rails, paint, structural steel, iron, car wheels, etc., etc., while the item of fuel, which is the largest single item, constituting as it does about 12 to 14 per cent of gross operating expenses, is given very slight attention on the majority of lines, and on some it is almost ignored.

One of the ablest writers on "The Cost of Locomotive Operation" (Mr. Henderson) shows in tabulated forms, page 8 of his book, the number of heat units per pound and the number of ton miles in freight service each kind would ordinarily make on a road in a level country.

This table includes 31 different kinds of coal, I will not read it, as it is too long, but I will simply quote from it. I find that the best coal has 14,000 heat units, that is, bituminous coal, while the lowest has 6,600 heat units.

TABLE SHOWING THERMAL VALUE OF COALS.

Kind.	State.	Locality.	B.t.u. per lb.	Ton- Miles, per lb.
Anthracite.....	Pennsylvania.....		14,000	7 00
Anthracite Pea.....	Pennsylvania.....		12,300	6.15
Semi-Bituminous.....	Pennsylvania.....	Connellsville.....	13,300	6.65
Bituminous.....	West Virginia.....	New River.....	14,000	7.00
Bituminous.....	Pennsylvania.....	Pittsburg.....	13,000	6.50
Bituminous.....	Pennsylvania.....	Youghiogheny.....	13,000	6.50
Bituminous.....	Ohio.....	Hocking Valley.....	13,400	6.70
Block.....	Indiana.....	Brazil.....	14,000	7.00
Bituminous.....	Illinois.....	Streator.....	11,400	5.70
Bituminous.....	Illinois.....	Mt. Olive.....	11,700	5.85
Bituminous.....	Illinois.....	Macoupin County.....	9,800	4.90
Bituminous.....	Illinois.....	Perry County.....	9,800	4.90
Bituminous.....	Illinois.....	St. Clair County.....	10,000	5.00
Bituminous.....	Illinois.....	Mercer County.....	13,000	6.50
Bituminous.....	Iowa.....	Good Cheer.....	8,700	4.35
Cannel.....	Kentucky.....		14,000	7.00
Bituminous.....	Arkansas.....	Huntington County.....	11,800	5.90
Lignite.....	Arkansas.....		9,200	4.60
Lignite.....	Colorado.....		13,500	6.75
Lignite.....	Colorado.....		8,500	4.25
Lignite.....	Texas.....		12,900	6.45
Bituminous.....	Kansas.....	Burlingame.....	10,500	5.25
Bituminous.....	Kansas.....	Cherokee.....	13,400	6.70
Bituminous.....	Kansas.....	Frontenac.....	12,100	6.05
Bituminous.....	Kansas.....	Leavenworth.....	11,100	5.55
Bituminous.....	Kansas.....	Leavenworth, nut.....	6,600	3.30
Bituminous.....	Kansas.....	Osage City.....	10,700	5.35
Bituminous.....	Missouri.....		12,200	6.10
Lignite.....	Iowa.....		8,700	4.35
Lignite.....	Wyoming.....		10,400	5.20
Lignite.....	Utah.....		11,000	5.50

(Henderson)

From the foregoing table it can be seen that among the Bituminous coals mined in Kansas, there is a range difference in heating value of 57.4 per cent and in ton-mile efficiency of 52.8 per cent, but in all probability, the prices paid for each 2,000 lbs. do not have so wide a range or fluctuation in value.

Taking the value of a cross tie at 75 cents and coal at \$2.00 per ton, one carload (50-ton car) is equal in value to 133 cross ties. Each individual cross tie is inspected, as a rule, by an expert, and if it is below a fixed standard of quality, physical condition and dimensions, it is either rejected or taken at a lower price corresponding to its value. Many lines have a large force of men engaged on this and similar work, doubtless saving the company much money, but in most cases the same companies receive and pay for thousands of tons of coal (through lack of proper inspection requirements), that is as far below its value in heat units, as a rotten tie or a knotty or wind-shaken stick of bridge timber, or a sappy car sill would be classed, even if it should be of proper dimensions. In other words, if avoirdupois, or cubic quantity, is the only requirement in the purchase of one of the most essential articles in the operation of a railroad, amounting to about 12 to 14 per cent of the total expense, then why not purchase cross ties, bridge timber, car sills, car siding and car decking and roofing and all other lumber by board measure only; and all castings, forgings and rolled plate by the pound or square foot, and

all liquids by the gallon only; as many of these articles are insignificant in value as compared to locomotive fuel, yet the inspection requirements are in most cases, as rigid as any government bureau maintains in the selection of their most important material.

I find in the division of operating expenses on one prominent railroad, some of the most important items of material that are subjected to the strictest investigation or inspection by high priced inspectors, their total cost per year amounts to one half of one per cent, of the operating expense, running from such low figures, up to as high as 12 to 14 per cent. Locomotive fuel, being about 12 to 14 per cent; roadway, 10.70 per cent; next in order, enginehouse and roundhouse men, 9.37 per cent; repairs to locomotives about 9 per cent; freight cars, 9 per cent; train service, 6 per cent; station service, 6 per cent; ties, $2\frac{1}{2}$ per cent; buildings and fixtures, 2.30 per cent; bridges and culverts, 2.20 per cent; passenger cars, 2 per cent; 2 per cent rails, 1.40 per cent; shop machinery, .66 per cent.

"QUALITY OF COAL ASH."

The fifth item in the author's paper, the question of quality having been referred to in the comments on table preceeding, does not leave much room for additional remarks. The question of ash in coals however, is of more than passing interest, and in this connection I will quote from Mr. Bement, one of the ablest engineers and coal mining experts in the country.

ASH IN COAL AND ITS INFLUENCE ON THE VALUE OF FUEL.

(A. BEMENT.)

"Strictly speaking, ash is an impurity in or combined with coal and in no proper sense a part of it. It is, rather, incombustible mineral matter associated with the fuel and remains as a residue after combustion. Under no circumstances is it in any way beneficial; on the contrary, its presence is decidedly harmful. In fact, the ash affects the value of coal in larger measure than any other feature of the fuel composition.

From a chemical standpoint, ash is of more complicated composition than coal proper, as the following list of elements found in it tend to show:

Principal Elements of the Ash.

Silicon
Calcium
Magnesium
Iron
Aluminum
Sulphur
Oxygen = 7

Elements of the Coal.

Carbon
Hydrogen
Sulphur
Oxygen
Nitrogen = 5

In addition to these principal elements, there are others present in much less quantity. These, in various combinations together

with alkalis, form compounds which are more or less fusible at temperatures of the fire, and this ready fusibility allows the production of clinkers. In a general way the clinker making compounds may be considered to be glass, fire clay and iron compounds."

Again not only the ash, but the question of earth that gets mixed in the coal through the mining of coal by the modern process of shot-firing, which frequently breaks the roof, allowing a great deal of dirt to fall down among the coal itself, is brought out with the coal and is one of the elements that as a rule comes out in the ashes and increases the amount of ash and clinker, causing the consumer to think it is a bad coal for clinkering, when in reality it is the result of admixture of soil or earth. This of course can be remedied by washing the coals, which has been practiced to quite a considerable extent in stationary plants, but I hardly think, it is practicable in railway service. However, doubtless there are some fuel agents here this evening and others who can give us some information as to what extent this may have been tried.

CAR SHORTAGES.

On the question of shortage of cars, as the author has well said, as a rule when there is a shortage of coal, there is a shortage of cars and when there is plenty of coal there is plenty of cars. That is quite true, and it is also true that there should be a very close relation between the fuel agent, the fuel consumer, which means the motive power department, the purchaser of fuel and the distributor of cars. It is not infrequently found by the railroad companies owning a large number of coal cars that a large percentage of this equipment is tied up by coal dealers who ship large quantities of coal in and hold it, waiting for an advance in price, when the cars are badly needed, either by the railroad company to handle their own fuel, or by other shippers.

Some two years ago, when there was a car famine all over the United States, and the railway companies were being pretty thoroughly abused by the press and public for what was termed their "criminal negligence" in the matter of coal cars, the situation became so acute and strained that the Interstate Commerce Commission took the matter in hand, with a view of trying to relieve it, and on one of the prominent lines that were heavy coal shippers they got after the officers so strongly that the management purchased outright of a private coal company the coal that was in some 75 or 100 cars at that time at a price about 30 cents in excess of what they would have to pay for their locomotive fuel, simply in order to free those cars, to get them into service, this for two reasons: first, to satisfy the Interstate Commerce Commission that they were not remaining silent in order to acquiesce in the wish of the coal company, second, to show the public that they were acting in good

faith and were willing, even at a loss, to get cars into service to get coal in when people were needing it in cold weather. This is a matter that should be handled by the railway companies in such a manner that there should be no possibility of private enterprises tying up for an indefinite period a considerable portion of the equipment of a railway company that is designed, built, purchased and intended for the use of transporting coal.

THE PRESIDENT: Gentlemen, the subject has been very comprehensively discussed and opened for you. There must be many here who have had a varied experience in the use of coal; possibly quite a number who have had valuable experience in the purchase of coal. We will be glad to hear from all or any of these.

There is one point in the author's paper on which I feel that there may be some difference of opinion and that is about the matter of inspecting. Mr. Symons has touched on that; probably there are others here who might not altogether agree with the author and if so, we will be glad to hear what they have to say.

MR. MCAULIFFE: It might be proper to make myself clear on that point. I believe in the inspection of coal, but it has been my experience that a coal inspector paid by the railway company and sent to coal mines, standing alongside of the car at some certain mine which is possibly loading five or six cars, in that field accomplishes very little. He may do a great deal of missionary work at that mine, and the real trouble may be coming from five or six other mines in that district. If we had the magnificent inspection force that Mr. Symons refers to here, we could put a man at every mine; we could see every car as it is loaded out of the mine; but the facts are that the ordinary railroad fuel department, whether handled by the fuel agent, purchasing agent or general manager, does not have one man to inspect every fifty cars purchased; instead of that, one inspector is assigned to a territory covering possibly four or five States. I find that the coal inspector, when he labors under those disadvantages, spread over territory as thinly as that, accomplishes practically nothing. I prefer to pick out the mine superintendent who is guilty of the greater number of deflections and give him a reasonable chance to bring his work up to the proper standard, or get out from under him entirely, and his business. In other words, give the business to the men who will furnish and put into the car the class of coal as near as possible, the contract calls for.

It is all right to take a \$75 man, or an \$85 man, or a \$100 man and send him down to Indiana or Illinois and let him watch one mine. I want to submit to you gentlemen that around some of those mines that produce 2,000 tons of coal a day, he does not get a chance to get his breath; the facts are, an ordinary man cannot live on a car where they are producing coal at that rate. That inspection must be under the immediate supervision of the manager, and

the man who manages that property and pays the miner for his best work is the man to properly furnish that supervision.

I do not propose to relax on the matter of inspection on the lines for which I handle fuel, but I do believe that a great deal of good can be accomplished by dealing with the man who manages the property and by attempting to bring the full force of his organization to bear on the question of grading, and let that force be applied at the face of the mine where the miner is producing the coal, and not try to put one victim up on the end of a coal car and try to hold him responsible for what happens in five or six States, or five or six coal-producing districts.

MR. W. G. WALLACE (American Steel Foundries): I would like to ask the author of the paper what would be the best way to proceed from the standpoint of an engine man or mechanical man in the department of a railroad. I have always found that the locomotive was the best coal inspector, and I know of a case where, after receiving a very good quality of coal for quite a period of time, the locomotive began to complain of the quality, in other words, it was not making the miles per ton that it formerly did. The Mechanical Department was interested and made an inspection of the coal, sent reports to the General Manager; the Superintendent of Motive Power examined the coal and made his complaint and even wrote to get the car numbers and everything of that kind, but the reply he got was, "You keep away from that coal dock." What are we going to do in a case of that kind to get good coal? There is where you want to get somebody who will get a contract and make specifications and have the coal furnished according to the heat units, but how far do they want to go? Should we go too far in our inspection and lose our positions by being too honest, or must we close our eyes and do the best we can and make a report of engine failures and say that it is poor coal?

MR. MCAULIFFE: Fortunately I have never known a railroad officer that expected me to wink at a coal that was costing the company excess money. I do not know what character of officer the gentleman refers to, but the several officers I am working indirectly under to-day expect me to get the best fuel that I can, taking into account the conditions that govern production and the purchase of fuel and to try to enforce the contracts. The gentleman suggests that the officer he has reference to, or a hypothetical case possibly, is more interested in the success of the coal company than he is in locomotive performance. I could not prescribe for a case of that sort; it never came under my experience. I have heard of cases of that kind, but I never saw one personally.

I agree that the locomotive is a good judge of coal; I believe honestly that it is a better judge than locomotive men at times, because it is an unprejudiced judge, and men sometimes are prejudiced, and the kind of help I am trying to get from our Motive Power men

and our Superintendents and the youngest locomotive firemen that we have, is prompt and intelligent information as to where the coal came from. When the Superintendent writes the General Manager and the letter reaches me in a week or ten days to the effect that they had some bad coal at some point 500 miles distant from my office on a certain day, that was probably mined two weeks before, it is very hard to trace the matter. I try to educate our people having charge of these matters to get hold of the car that the stuff was taken out of and give me the number and we will try to locate where it came from and as quickly as I can get a man to that mine I will put him there. I appreciate possibly the position is a difficult one; that it has continued and will continue for several days before we can effect a remedy, but the instructions I give my coal inspectors when they get on the ground, in a case of that sort, is to secure evidence and institute an embargo against that particular mine, and, without reflecting on the coal producers of the country, I will say I have two or three embargoes in force all the time. I find it never hurts the railroad company to order an embargo, and it stimulates the gentlemen in charge, not only in regard to the product they sell us, but also improves their commercial output.

I believe the man who is purchasing coal suffers more from lack of intelligent complaint than from anything else. It is very hard sometimes to effect a remedy when a man simply says, "Day before yesterday we had bad coal," and when we come to look up the question, we find he has no car number and we cannot get a clew. Possibly the office of the man who made the complaint is located not more than 200 feet from the coal chute, the men who handle the coal are on his pay roll, and the way-bills pass through his office. Now, that man should get at the location of the coal and wire the man responsible for the purchase, or the ordering, and then he in turn should put somebody on the ground at the mine.

MR. P. H. PECK (C. & W. I. R. R.): It may be all right for the gentleman who spoke about getting the numbers of the cars, but we cannot do it. Take coal chutes that hold from ten to twenty car loads, how is an engineer or fireman to tell the car from which the coal came? A railroad man cannot do it. On a railroad everything such as steel, brasses, etc., is bought under a specification, and the only thing that is not bought under a specification is coal. Coal should be purchased under specifications in order that we can check the coal according to the heat units it contains. Coal should be put under specifications, just the same as anything else, so many heat units to the ton, even though there may be a variation of a couple of hundreds more or less; it should come somewhere between the maximum and the minimum specification. There is the trouble we have with coal. Take the Northwestern Railway chutes, where there are 25 to 40 carloads in one chute, nobody can tell what car it came out of; a coal man cannot tell where they unloaded any particular

car. The coal should be bought on specifications, some should be taken out of every car that comes from the mine and tests made to see whether it has the number of heat units specified in the specifications that it was bought on.

MR. F. SLATER (C. & N. W. Ry.): I should like to say a few words as to the difficulty we have in telling from where the coal comes. We get our coal delivered in boats and the stock pile will contain from 70,000 to 100,000 tons of coal. It will be absolutely impossible for any one to tell, when we get a bad lot of coal during the winter months, where that coal came from after scooping it out of a 70,000 ton pile.

THE PRESIDENT: Gentlemen, it seems to me that the place to insure your quality of coal is before it goes into the fire box or onto the tender, or before it goes into your storage pile, otherwise you are inevitably up against the difficulty mentioned by the last speaker, of locating the party primarily at fault for furnishing poor coal. I will say that the road with which I am associated has found it worth while to put on quite a force of coal inspectors, men who visit the mines and who condemn bad coal on the cars before it leaves there, and by so doing they have compelled the mine operator in many cases to put on three or four of their own inspectors where they had only one, and that has resulted in throwing out or picking out a great deal of refuse matter which otherwise would have been shipped and paid for as coal. Our Fuel Engineer has made quite a careful canvass of the subject and has figured that by employing a moderate force, considering the territory covered, he has saved probably more than \$10 for every one that it has cost the company in the way of inspection.

MR. SLATER: Mr. President, the object of my remark was along the same line as yours; coal should be inspected at the time it is purchased and not when it goes to the locomotives. The conditions I work under are such that if we wait until the locomotive gets it, we can not find out anything about it. It would have to be done at the mine and no where else.

THE PRESIDENT: There must be a good many here who have had experience with coal, possibly not all in purchasing, but in inspecting it, or using it, or complaints about it, that might be worth hearing. We should be glad to hear from any of you. Are there any Storekeepers or Fuel Agents here who are up against this coal question? Mr. Squire, I think you were about to speak.

MR. W. C. SQUIRE: Mr. McAuliffe and Mr. Symons, in their discussion of this subject, mentioned the question of storage of coal. My attention was called to this some time ago, and I understand that the Rock Island Road, with which Mr. McAuliffe is connected, has made some very elaborate experiments with the question of storage of coal under water. I should like very much to hear from him as to what results they have obtained by the storage of coal under

water compared with air stored coal. I realize that there is considerable difference between the two, but the actual figures, results of work done, ought to be of value to us.

In this connection, I know that the United States Geological Survey, Department of Mines and Minerals, have at the Carnegie Institute in Pittsburg, one of their specialists at work on this question. Whether he has been working in connection with the Rock Island or not I do not know, but I heard him say that he has been in correspondence with practically every one who had this subject under consideration. He has gone so far as to investigate how much heat is involved in the different parts of the pile, so as to determine where and how the greatest proportion of the hydrocarbon and volatile acids are lost, and about which Mr. Symons spoke, being the greatest loss of heat units in storage coal. As we all know, storage coal has not the steam making value that coal has that comes from the mine or has been out but a few weeks, and it seems to be necessarily a fact that hydrocarbons are lost. I was somewhat struck with Mr. Symons' remarks that this loss represented $28\frac{1}{2}$ per cent of the total heat value of the fuel. It is a new figure to me and I should like to know something about it. In other words, over one-fourth of the heat value is lost.

In reference to inspection, I agree with several of the previous speakers and more particularly with Mr. Symons, that if 14 per cent of the total amount of expense incurred by the railroads in operation is spent for coal, it should have as close and in fact closer inspection that any other source of supply for which money is spent, and I agree with our President that the money would be well spent and would make a great return on the investment.

MR. MCAULIFFE: The Rock Island Company, or none of the companies I am connected with, have ever made any experiments in regard to storing coal under water. That would involve an expense so large as to overwhelm even as wealthy a road as the Rock Island. We stored about 500,000 tons last spring and somebody brought that question up, and I figured how many acres we would have to excavate to get a pit eight feet deep to take care of 30 days' coal, but I could not figure out where we would dump the earth that we would have to remove. The storage of coal under water for a railroad is absolutely out of the question, at least in my opinion.

The University of Illinois demonstrated that coarse and screened coal, or slack screenings could be stored under water with a minimum loss of heat. The first experiments I ever heard of were made by the English navy; they stored coal under salt water and their tests proved that it actually increased in value by a six months' submersion in salt water. There are tests and tests, and incidentally there are coals and coals.

The gentleman spoke about the B. T. U. proposition; that is very nice. The one problem that I have to wrestle with to-day is to get

service out of the best coal in the West, from a B. T. U. standpoint, and if any gentleman here will tell me how to make every locomotive man and superintendent happy with Arkansas coal, which the United States Government ranks second to the Pocahontas of West Virginia in strength and steam-making efficiency, I will be deeply obliged to him.

Speaking about ash. I am buying in Alabama for the Frisco Road a coal that runs 18 per cent in ash, and we rarely have a failure, simply because the ash does not make a refractory clinker; you can get rid of it. The coal you have to look out for is frequently the one with the smallest per cent of ash, the ash that makes a clinker, that consists of iron and sulphur that clogs up the grates, prevents the proper ingress of air, with consequent failure. Yet, if you put that same coal under the B. T. U. test, it will rank high.

Mr. Symons quoted Mr. Henderson. Mr. Henderson mentioned coals running from 14,000, I believe, down to 6,800 B. T. U.

MR. SYMONS: Sixty-six hundred.

MR. MCAULIFFE: I will submit, that coal containing but 6,600 B. T. U. will not take a freight or passenger engine over a division.

Some years ago on the Northern Pacific Railway we tried to work with Dakota lignite that runs about 8,500, and the railroad built locomotives with combustion chambers, put in brick arches, put on stacks wonderfully and fearfully designed and proportioned, and they discharged motive power men, and firemen incidentally, because they could not get service out of 8,500 B. T. U. coal. To-day they are buying coal in Illinois and pulling it up to the lines in Dakota and they have found better lignite since than they had then. I want to say, that no 6,600 B. T. U. coal will ever give service in a locomotive firebox.

We are burning coals purchased in Illinois on the system of roads with which I am connected, that rank materially below other coals and with better results, for the simple reason that they do not produce a clinker or a refractory ash. The fact of the matter is, that if you get a coal that runs as high as 12,100 B. T. U. and you can keep a reasonably fair fire and get air to it, you will not have very much difficulty in getting steam; but if you take one that runs 15,500 B. T. U. and it is four or five or six per cent ash that makes clinkers, you will have trouble before you get over the division.

Returning to the question of inspection, I do not want to attempt to act as attorney for the defense. The coal men are amply able to take care of themselves, but the trouble with the average motive power man—and I want to say this advisedly, because I started in the Motive Power Department and almost feel that I am there yet—the trouble with the average motive power man, and incidentally the average operating man, is that he does not know much about the production of coal. We are buying coal for the Rock Island-Frisco lines in Kansas to the extent of 80 to 125 cars a day. Most of that

is mined out of a seam 36 inches in thickness; some of it is so close to the surface that, as a miner said to me once, it will start to rain in his room about twenty minutes after it starts to rain outside, and that fellow is working on his knees in about six inches of water, with a light that is practically of no consequence—he is working in the dark. The stuff comes up in a little low car, is dumped over a screen and water runs out of it and down through the car in which it is loaded, and a large percentage of the slack and the mud that is shoveled up with it sticks to the coal. Still Kansas coal is a splendid coal. Neither is it practical to wash locomotive coal, if a man will stop to figure the volume of stuff that is required by the railroads in the Mississippi Valley.

I do not want to get into labor matters, I do not believe it is within the province of this Club to discuss the differences between the coal operators and their employes, but I will just say this much: I do not believe there is a coal operator in the Mississippi Valley who is running his own property; the pit committees are running it, and he does pretty nearly what they tell him, and he produces the coal in their way. We can pound him, as we have been doing, down to a receivership and then take hold of a new candidate and put him through the same course and that is about all there has been to the coal business for the last few years. A few years ago a coal miner took about two dozen picks down with him and he under-cut the coal and then he put a light shot in, bringing the coal down in lumps and when he sent the coal up it came up in very good shape; there was no slate, or roof, or bottom mixed with the coal which Mr. Symons speaks of, and if there was a six or eight or ten inch vein of slate, he had a chance to clean the product, separating the coal from the refuse. The practice to-day is for a man to take an augur that bores a $2\frac{1}{2}$ to 3-inch hole, bore four or five holes in the face of his room at varying angles, as far as he can go, about seven feet apart, put two or three sticks of dynamite in the bottom of the hole, which he slips in surreptitiously, fills the balance of the hole up with black powder, goes out at 3:30, and turns the job of firing those shots over to the shot-firers, and the papers are full of the rest.

About the use of dynamite, I have been making that my special business in the Southwest on the Frisco lines and have worked with operators and operators' associations to keep dynamite out of the pits. We have a town in Kansas of about 16,000 population, in the center of Kansas coal district, with a street car system that radiates from Broadway with miners' trains, leaving at six o'clock in the morning. There is not a street car with its trailer that goes out of that town in the morning that has not enough dynamite in the dinner cans, or tucked away in the shirt bosoms of the miners to wipe a block or two off the map if anything happened to one of those cars. You talk about regulating miners and regulating the grade of coal—I have crawled a great many miles on my stomach

through coal mines in some of the thirteen States where the mines from which we buy coal are located, and I have been charged with putting some fellows out of business in the coal producing lines. We cannot carry that thing more than about so far; we will have bad coal just the same as we will have head-on collisions and you cannot employ inspectors enough to keep it down. Any man who can secure for the average fuel purchasing agent additional inspectors is his friend; we want the help, but it is that question of expense that hangs over all our heads and limits the number of men we can employ. We can find use for them. I have yet to find the master mechanic who had five or six clerks sitting around his immediate office. You ask one of them for prompt reports, his answer is that his force is overworked. Why does not he get help? The President in his desperate efforts to make both ends meet tells us practically through his General Manager how many men to employ and what wages to pay them, and we are brought up against the question of economy and cannot employ enough men to spread ourselves around and for the few that we have, the trouble is, the day is not long enough.

Some of the best motive power men I ever saw said that the best and most efficient work in the fuel line could be done at the locomotive firebox door through the medium of instructors. Gentlemen, do not talk to me about individual locomotive performance sheets. In these days when an engineer will go up to the chute and whistle for eight tons of coal, or twenty—he is just as likely to whistle for twenty as he is to whistle for eight, and when the foreman says he has put on ten, and a ticket is issued for six and they ask the accountant to make up the fuel performance sheet on the basis of those tickets, we do not get a very satisfactory result. Fuel performance sheets do not spell anything to me any more. I used to believe in them when I was young at the business, used to look at them, study them, wonder why one should be better or worse than the other; I have gotten over that. The only fuel performance sheet the railroad can make to-day is to find out the total number of tons used during the month and divide that by the number of ton miles hauled during that time and get the system situation; we can get that reasonably close, but the individual locomotive, or locomotive-man situation we cannot get. If some of the people who get out those reports would take fifteen minutes to analyze one of them, they never would make another. The average locomotive engine man is getting too smart to be fooled by that kind of sheet any longer; he refuses to take it seriously.

There are limitations that apply to the coal producer, to the motive power man and the fellow who is supposed to make the water boil with coal, and the only thing to do from the dollar-and-cent standpoint is to get together and make the very best we can out of the conditions, and while I will agree with the gentleman who gets

his coal in a boat, that the boat number would not be of any use to the purchasing agent or fuel agent, I do believe that the average roundhouse foreman or division foreman whose coal chute is located adjacent to the coal mine, could hustle around and give us a better class of information than we are getting, but no mechanical man will ask the company to pay for inspectors when we would require about three hundred men for that purpose alone. The trouble is, as Mr. Symons has stated, that nobody pays much attention to coal. It represents, as he said, 14 per cent of the gross earnings of the railroads, and the average man never cares to talk about it much, except to complain about it. It deserves more attention and more supervision, but you will never get it through the medium of taking car lot samples and applying B. T. U. tests to them. That is a refinement that will not work out in locomotive practice. The United States Government is attempting that to-day and are falling down on the proposition. A great many engineering firms are advocating that scheme; they want to test coal, which is a laudable ambition, but there are very few people in these days of close margins that can afford to pay for that kind of thing. Frankly, I do not believe it is productive of results.

The United States Government spent a great deal of money at St. Louis and Pittsburg testing coals. I went out there with their geologists and their employes, and I crawled through the mines and gave them coal and induced our companies to haul it free—we could do it in those days—I got the results of the tests, but I never got very much out of them. We gave them coal and they took it three hundred miles and put it under a 250-horse power boiler that was under-worked and they got certain results, but the conditions under which that coal was burned were so totally foreign to actual conditions on the road that the comparisons were of very little value.

The best coal that a railroad can buy to-day is a coal that will take a locomotive and a full tonnage train over the road with the minimum amount of trouble. I speak advisedly on that subject, because complaint means reduction of tonnage, setting out freight, leaky flues and consequent boiler work, additional power, reduced mileage; it means the tying up of cars. The men tie up now at the end of sixteen hours—they used to go out and meet the other fellows—and the best coal, as I said before, is that coal that will take a full tonnage train over the road with a minimum of trouble. But "beggars are not choosers," and that really applies to the fuel business.

I am trying to purchase about 425 carloads of coal a day and we procure some of it from mines that produce as low as 50 tons and they need the business; they want the help. I believe we are getting 110 cars daily in Kansas from about forty mines, and it is not possible for the man buying the coal to restrict the number of mines very materially. There are seasons when the mines have no other business but the railroad business; they have to give the men in those

mines two or three days a week and they must give the other men in the other mines an equal chance, and that means that you must take the coal from every mine the company owns. You can embargo, as I said a while ago, but you cannot maintain a permanent embargo against that mine without closing it up, and when you close a mine you destroy an asset, and the man who undertakes to go ahead and plow through the fuel business and ignore the economic side, the traffic department, the entire dollar-and-cent side of the railroad is going to be a short lived proposition.

I said to-night I did not believe in buying traffic with a coal contract. I do not believe in buying coal with an empty car, or part car and part cash. I believe in making the best trade you can with a responsible man, that is, you take into account that man's limitations, just as he has to take into account your limitations. We want to be fair enough with the coal men to be able to ask them to be fair with us. There are times when railroads do not furnish 50 per cent of the equipment that the coal mines have use for—there have been such instances in the past—and under those circumstances the fellow who is buying coal for the railroad company has got to pretty nearly stand back and keep his peace. He cannot go out and start a riot. That condition, however, has been an easy one for the last year. We have in this country about 310,000 idle cars, I believe, and cars are going begging for something to load into them, but we are all hoping that that condition will pass in a few months and we will be short of cars again, and when we are short of cars, that means that we have people who want coal; those people are managing industries and they are producing something that you want to move, they are producing something that several communities you serve want to buy, and you have to give them a chance, you have to work with them.

A great many people who do not understand the fuel purchasing business think that the fuel agent, or purchasing agent, or whoever buys it, is an autocrat, and the whole thing is up to him, but the fact is he is just one small cog in the wheel. It is a business proposition, and like any other business proposition, has to be looked at broadly, and you have to see the interests of your company as a whole, and the interests of the company as represented in the other departments that you are related with and working with. You have to work harmoniously with them, just as you have to work with the locomotive crew that wants to get coal and wants good coal.

MR. SYMONS: In answer to Mr. Squire's question with respect to the question of percentage of inferiority of fuel as measured by heat units, what I intended to say was this, that coal purchased on the assumption that it contained 14,000 B. T. U. (meaning British thermal units) was $28\frac{1}{2}$ per cent more valuable or of greater value, than a coal with 10,000 (or 4,000 less) heat units, which, as I figure it, is $28\frac{1}{2}$ per cent. However, since Mr. Squires called my

attention to it, and if it is not clear, and I may be allowed to amend it, I would add by saying that any fuel that is 28 per cent inferior in quality to another in the amount of heat units as developed by laboratory tests, would probably be 30 to 35 per cent less efficient in service, by virtue of the fact that the 28½ per cent inferiority was due to the presence of certain matters that absorb the heat units, and go to stop up the firebox and interfere with the draft of the engine, so that in actual practice I think a bituminous coal that is 28½ per cent inferior to another would, in the actual practice and use in a locomotive, be over 30 per cent inferior by virtue of stopping up the firebox, having additional clinker, ash and other impurities.

Of course, in speaking of the above results, I have in view bituminous coal with 12½ to 25 per cent volatile matter held in combustion. Another reason why I think it would be more than 28½ per cent is the fact that in the process of combustion each pound of coal requires about 140 cubic feet of air for combustion. The amount necessary for a freight engine going over a 100-mile division (a consolidation engine) assuming that it would burn 16,000 pounds of coal, would be 288,000 lbs. of air, requiring 2,240,000 cubic feet of air; therefore if the coal is 28½ per cent inferior in quality, it would soon fill up one quarter of the firebox grate area, which would amount to 30 to 40 per cent inferiority before the division was gotten over.

In the matter of deterioration of coal, which has been again referred to by the author of the paper, I think his remarks are quite correct. I want to add, however, that while I do not wish to criticize anything in respect to the results of laboratory tests, because I believe they are absolutely correct, and report invariably the results obtained by those tests, yet the fact remains that the laboratory tests will not always do to compare with actual service tests, or actual results obtained in service, particularly in the matter of combustion of fuel for the reason that the quantities of coal subjected to tests and the quantities that are stored outside are entirely different. I have personally known a case where laboratory tests showed a depreciation of only 7 per cent in a period of about nine months, at a point near the mines, while in fact a trial of some 1,400 tons of the very same coal that was hauled some eight or nine hundred miles away from the mines, and stored outdoors under entirely different climatic conditions, and in larger quantities than that stored at the laboratory showed a deterioration of over 30 per cent and it was absolutely impossible to use some of it, for the simple reason that exposure to the elements, in result or in effect upon it was equivalent to a slow process of combustion, resulting in much of the fuel practically becoming almost useless, a great deal of it, at least, therefore the laboratory tests could not in all cases be used for what we might term a yard stick with which to measure the exact value of coals that are exposed to the elements in larger quantities and under different climatic conditions than those that exist in the laboratory.

With reference to submerged coal, it is quite true that in some of the Government tests of coal submerged under water, it contained a greater heat value than that exposed to the elements, or of newly mined coal, but, as Mr. McAuliffe says, the cost would be absolutely prohibitive. Such treatment could not be considered under any circumstances whatever.

In regard to the question of waste fuel, or waste of coal in mining, I will quote from one of the ablest authorities on the subject, as follows:

WASTE OF COAL IN MINING.

On Page 17, Bulletin No. 8, Illinois State Geological Survey, we find the following language bearing on the question of Waste of Coal in Mining:

"It is well known that there is, under present commercial conditions, an enormous waste in the mining of Illinois coal. In individual districts this has been estimated to amount to as much as 60 per cent, though of course, such losses are not general. It would, however, probably be safe to say that in many places 40 per cent of the coal is left in the ground or is ruined in the process of mining."

In addition to this, the shot firing method of mining which has been described by the author of the paper and which is generally unknown to the consumers, results in getting in what is called run of mine coal, 60 to 75 per cent of fine coal, dust and dirt.

In addition to this, the roof comes down, letting the earth, slate and common rock into the coal, and frequently the floor is shot up, all of which is taken out and sold to the railroad company, and they try to make steam with it, and haul trains, which is found to be rather a difficult proposition.

MR. WALLACE: I would like to ask some of the gentlemen here tonight if it is not the policy of railroads, when a man opens a coal mine, to help give him a start and buy some of his coal and develop his mine and afterwards let him sell his coal for commercial purposes? That being the case, if the fuel agent issues instructions to help that man along by taking so many cars of coal, it would result in the development of the mine, and after he got on his feet, then, his coal would be switched to some one else. The railroad is a pretty good fellow and usually does that, does it not? That is the point I would like to have answered, that we might know how these things come about. Ordinarily, the motive power man does not know where the coal came from, nor does not care; he only knows that it is not the quality of coal that he ought to have to prevent delays and failures.

MR. MCAULIFFE: I will answer for 16,000 miles of railroad in the Mississippi Valley by saying that that is not the practice. We do not nurse any new coal propositions up through the creative stage. They usually have to pass the swaddling clothes stage before we feel that we are justified in doing business with them, but if in the judg-

ment of the executive officers of the roads that I serve it is necessary in order to build up a traffic to do that, I would expect to obey them, and take the coal and get the best possible service out of it. I believe there are possibly some roads in the country where the coal tonnage is a large part of their business that do undertake to nurse coal mines into life, but that has not been my experience on the four roads with which I am connected.

Speaking about fuel economies, I wonder if there are very many motive power men who stop to figure how much coal they have to throw into the firebox of a wide firebox locomotive to get a start, how many tons of coal they have burning there and how many hours that engine stands on the roundhouse track, very frequently with a ten-inch pump jamming under the fire, how much coal is burned in that way, how frequently fires are spoiled in that way and how frequently flues get their initial start towards leaking and failure in that way? I have very frequently seen engines stand ten and twelve hours on the roundhouse track; possibly the Chief Dispatcher frantically called on the Motive Power Department for engines when he did not want them. How much supervision do we give to the care of that engine in the absence of the engineer and fireman while she is waiting for the crew to come and take her away? The practice is to let the fire die and then to come out and shovel a quarter of a ton of coal in, and put the blower on and leave that on until the hostler makes the round of five or six others in similar condition, and then come back and put about six or eight inches of water in with a 10½ injector, or both injectors if they are handy, then let her die again, and repeat that dose six or eight times. Possibly some of you Motive Power men will recognize the earmarks. I put in some years at that business and I have seen it done. Usually some representative of the Czar of Russia, or some gentleman lately from Sicily at \$1.40 "per" is the one that is taking care of the engine while the crew is getting the tail end of that 16 hours' rest that Mr. Roosevelt has provided.

We are all remiss in this coal proposition. We do not do our part. I have recently been a party to the matter of attempting to reduce engine failures primarily charged to coal. Stopped up flues are factors in the engine failure line. The most remarkable thing about the coal business to me is that we have the fewest complaints where we get the poorest coal. We are buying about 200 tons of coal, semi-lignite, in Texas; it comes out in slabs about as large as a roll top desk; the seam is about 28 inches thick, but they bring it out in large slabs with 15 to 16 per cent, more or less, of ash. They pump about two tons of water to every ton of coal that they lift, and the stuff runs about 12,200 B. T. U., and we do not have as many engine failures as we have with some coals that run 14,300 B. T. U. We are buying coal in the Northwest, in Iowa—I am not reflecting on coals produced in the State of Iowa, but we are buying coals there grossly

inferior to coal bought in other places, with a minimum percentage of engine failures. We are buying coal unscreened in certain districts, for instance, carrying 12 to 15 per cent ash, that is less productive of failures than screened coal that is higher in B. T. U. and does not carry 6 per cent of ash.

That brings me back to that statement I made a while ago, that there are coals and coals, and the only practical place you can go to determine the relative values of coals is in the locomotive firebox, if you want to make use of it for locomotive purposes.

I am very much interested in Mr. Symons' figures as to the relative values of coals carrying 14,500 and 10,000 B. T. U. The point is, his figures are eminently correct, but there is no railroad in the Mississippi Valley that I know of that is burning, or ever could successfully burn coal as low as 10,000 B. T. U. So, while Mr. Symons' figures are correct, the difference will never approach the 28 per cent proportion. The coal I have seen burning on 16,000 miles of the Rock Island-Frisco system runs from 12,750 to 14,300 B. T. U., with the exception of the small quantity bought in Texas, and we are having about as few troubles there, and as I said before, possibly fewer, than we are having in the districts where we are burning more expensive coals, or at least a coal that tests relatively higher.

MR. SYMONS: With reference to Mr. Wallace's remarks a few moments ago, which have been principally answered by the author, will say that I am inclined to think that some railway companies do try to foster and encourage coal mining industries, in fact, their attitude toward coal mining as a general proposition is similar to what it would be toward any other industry along their lines. They will, as a rule, buy cross ties and other material from people along their lines, provided they can furnish the quantity and quality desired, and the same thing is true with regard to coal, although the question of price has something to do with all these things, and you might say is the controlling factor.

And in this I find that the price of bituminous coals in the United States varies from .99 cents per ton at the mine in West Virginia to \$3.90 in Nevada and Alaska. The coals in the Mississippi Valley run about an average of \$1.23 per ton at the mines as follows:

In Illinois	\$1.06
In Indiana	1.05
In Iowa	1.57
In Kansas	1.52
In Kentucky	1.12
In Ohio	1.10

Average \$1.23

These being the principal coal producing States in the Mississippi Valley, and it would be my idea we could safely assume that railroad companies, where the quantity and quality are satisfactory,

patronize the mines along their lines, for the reason that the question of transportation is quite an item in the value of fuel.

It has been said by certain authority, (I am not sure as to the correctness of it), that the average price of coal the world over is *less than five cents per ton* to the original owner of the land or mine, less than five cents per ton.

Referring to the chemical composition, or more properly speaking the analysis showing heating value referred to as the B. T. U., I think the author is quite correct in his criticism as to the work which might be expected from low grade fuel. I will just quote the figures as taken from Henderson on heating values. In Kansas, I find that it runs from about 13,000 to as low as 6,600 B. T. U., the best coal in Kansas being rated at 13,400; Illinois bituminous coals range from 9,800, which is the Perry County coal, up to as high as 13,000 in Mercer County, while the Iowa coals, some of them run as low as 8,700. The variation spoken of by the author both in quality and results from use I think is what may ordinarily be experienced in the general run of coal, yet at the same time I believe that there are times that coal bought under promise, guarantee or pledge by the mine owner that it is strictly first-class or a good average run of mine coal, when possibly a large percentage of it would not come up to more than 8,000 or 9,000 B. T. U. under a test and would therefore be 30 to 40 per cent below a good average grade in heating value.

In reference to inspection, I am inclined to agree with the author that it would be almost an impossibility to personally inspect every carload of coal, and that some method of locating bad coal should be followed whereby pressure could be brought on the mine owner so that he would sharpen his wits and devise some method whereby he would provide more able inspection and thereby fulfil his guarantee just the same, as people do who sell rails and ties, bridge timbers and other materials that are thrown out when found to be of poor quality by ocular inspection. A great deal of bad coal goes to railroad companies with the full knowledge of the seller, because he knows, as the author has well said, that dead men tell no tales. After the coal is burned, having gone up in smoke and ashes, the railway officials fight out the delays it caused. And, as a rule, he can continue business relations with them by promising to do better in the future, the promise being, not infrequently, accepted by some one who does not know good coal from bad.

COMMUNICATED.

MR. A. BEMENT: In reference to the matter of "deterioration" of coal, there has and still continues to be much confusion of thought and belief. A few years ago an unauthentic statement was extensively copied by a certain class of publications to the effect that

bituminous coal in storage lost about 30 per cent in value. This would certainly be a deplorable fact if true. When this statement was brought to the attention of one of my clients, he suggested as a remedy, the building of a secure fence around the coal.

While the subject is one that has resulted in much speculation, my own observation with coal in Illinois, for example, with two of the more important seams mined, is that in the case of one seam it does not show perceptible loss in heating value or in quantity with outdoor storage of one year; with the other, the coal stored for a like period appears to deteriorate less than a total of one per cent. With the latter coal, however, it slacks down very readily, this slacking occurring on the outside of the pile where exposed to the air and weather. Between the two seams there is a great difference in the tendency to slack, and it is the result of my experience that the greatest damage occurring to the storage coal in question is this slacking, or in other words, disintegrates to small size, rather than any loss of heating power or dissipation of quantity through the evolution of gases.

It is probably unfortunate that the experiments reported by the State University were given such wide publicity, because the losses actually occurring are much smaller than those experiments appear to indicate. In my own case, it was only after repeated experiments that I ventured to adopt any conclusion concerning the subject.

MR. G. L. BOURNE: Is it not a fact that greater efficiency can be accomplished with less delay to trains and greater satisfaction to all interested parties, if every effort is made to give the different Divisions the same grade of coal continuously, or coal from the same mines continuously? I know from my own experience in engine service that it makes a great difference to the engine crews when the grade of coal is changed, particularly if a fireman is not used to that particular grade of coal. You can take a grade of coal that may not run high in B. T. U.'s, but the crews who are used to it will get better results than from coal higher in heat units with which they are not familiar. As Mr. McAuliffe states, the coal may be higher in B. T. U.'s, but if not handled by those familiar with its peculiarities make a heavy iron clinker. I would like to ask if the railroads are making an effort to give a division the same grade of coal continuously.

MR. MCAULIFFE: The point is a splendid one. It has been my experience that when locomotive men on a division are burning a medium grade of coal, or a slightly inferior grade and you substitute a superior grade, you will have trouble. Ordinarily we do not get credit for substituting superior grades of coal, but that is a fact, and when such is the case, you can readily appreciate how the engines will fall down when we substitute a poorer grade of coal. The facts are that locomotives do not need drafting nearly as bad as locomotive men. We are trying to draft some engines to try to burn Arkansas coal that have been down there for months, I mean, to

burn Arkansas coal with a minimum of complaint. On the Frisco we are subject to business fluctuations on different parts of the system. We take three or four locomotives that are burning Alabama coal, hustle them off to Texas, put them in a stock rush; take them out of a district where coal carried 36 per cent volatile matter, and 50 per cent fixed carbon, and put them in a district where the coal runs 76 per cent fixed carbon, and about 16 per cent volatile matter, and we never make a change in front ends or grates, but we do not send the men that are drafted for Alabama coal with the engines; we employ men down there who are drafted for Arkansas coal; the engines are not nearly as sensitive to the fluctuations in the character of fuel furnished as the crews are. We buy coal of certain mines in the west and we found one that was inferior; we embargoed against it and the gentleman that operates the coal probably recognized the validity of our indictment and said, "All right, we will take care of you from the other places," but the Mine Workers decided to shut him down at the other places for three weeks, and it was up to me to get coal. I had to go back to the embargoed mine for three weeks and then we got complaints.

Now, those are conditions that a fuel purchasing agent, even with unlimited resources, and the capital of Mr. Harriman behind him cannot control. He should try to keep them down, and I believe the majority of men appreciate the necessity of that, but we cannot always control things. I am not going to talk any more tonight, except to say one thing. I thought in writing the paper in which I would bring out nothing (that is no point of importance) I would at least succeed in getting the members of the Club to talk. I am going to say in my own defense that I studiously refrained from telling you anything; I could not tell you much of anything, but I kept from trying to tell you anything with the expectation that I could listen and learn something. The result is that Colonel Symons and myself (both from Missouri, by the way) have done about all the talking, and to some extent I am disappointed. I am grateful to Colonel Symons.

THE PRESIDENT: I feel assured the gentlemen here present have been so entertained that they have not felt that they would like to stop the flow of eloquence and information that has been coming from Mr. Symons and yourself, and I want on the part of those present, to thank you both for your kind discussion, and you in particular for the paper which has started discussion.

If there is nothing further to be said on the subject, this meeting will stand adjourned.

OFFICIAL PROCEEDINGS
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The regular monthly meeting of the Western Railway Club was held at the Auditorium Hotel on Tuesday evening, February 16, 1909, President M. K. Barnum in the chair. The meeting was called to order at 8 P. M. Of those present the following registered:

Allison, W. L.
Arlein, E. J.
Bacon, C. G. Jr.
Barnard, H.
Barnum, M. K.
Blatchford, Carter
Bourne, G. L.
Bryant, G. H.
Buckingham, C. L.
Bunnell, F. O.
Callahan, J. P.
Carr, R. F.
Chisholm, J. E.
Conger, C. B.
Converse, W. A.
Cooke, W. J.
Covert, M. F.
Davidson, G. M.
Derby, W. A.
DeVoy, J. F.
Dewar, J. I.
Dodd, T. L.
Endsley, L. E.
Ensign, H. W.
Faragher, R. S.
Flavin, J. T.
Fogg, J. W.
Forsyth, Wm.
Friday, C. B.
Fries, Henry
Geer, R. B.
Goodnow, T. H.

Graves, F. W.
Hahn, F. W.
Harkness, F. L.
Henderson, T. D.
Hinchey, W. W.
Hodgkins, E. W.
Hopkins, G. H.
Jacquette, W. O.
Jeffries, B. H.
Jenks, C. D.
Jett, E. E.
Jones, L. E.
Kleifges, Geo.
Kucher, T. N.
LaBach, P. M.
LaRue, H.
Link, R. T.
Lovell, C. P.
McAlpine, A. R.
McCormick, A.
MacKenzie, D. R.
Madson, S.
Maus, N. R.
Midgley, S. W.
Monroe, M. S.
Moody, W. O.
Morris, T. R.
Motherwell, J. W.
Nathan, C. A.
Neely, B. J.
Niles, W. E.
Peck, Chas. L.

Peck, P. H.
Pratt, E. W.
Prentiss, G. N.
Price, Robt.
LaQuay, M.
Richmond, F. L.
Robb, J. M.
Roddy, J. F.
Royal, Geo.
Ryder, G. E.
Sawyer, L. W.
Schlegell, Frederick von
Schmidt, E. C.
Seidel, G. W.
Seley, C. A.
Sharp, W. E.
Shaw, H. P.
Shaver, M. E.
Shultz, Chas.
Shumate, F. D.
Simons, J. E.
Speirs, Andrew
Squire, W. C.
Stack, T. G.
State, R. E.
Steuell, C. W.
Stott, A. J.
Stuart, J. R.
Studer, F.
Sturgis, R.
Symons, W. E.

Talbott, Chas.
Tawse, W. G.
Taylor, J. W.
Thomas, C. E.
Towsley, C. A.

True, C. H.
Walbank, R. T.
Watson, Geo. L.
White, J. L.
Wickhorst, M. H.

Winn, C. F.
Wilson, L. F.
Winslow, H. L.
Woods, A. C.
Wright, Wm.

THE PRESIDENT: The meeting will please come to order. The minutes of the last meeting have been printed and circulated, and if there are no corrections, they will stand approved as presented. The Secretary has some announcements to make that we will now listen to.

THE SECRETARY: Mr. President, I have the usual membership statement.

New Members

Name	Occupation	Address	Proposed by
Henry Bramer, R. H. F., C. I. & S. R. R., Gibson, Ind.			A. B. Fromm
A. B. Wright, R. F. E., C. I. & S. R. R., Gibson, Ind.			A. B. Fromm
Thos. E. Layden, Ass't Engr. Tests A. T. & S. F. Ry., Topeka, Kan.			J. D. Pickard
R. V. Coutts, Spec. App., Union Pac. Ry, Kansas City, Kan.			C. W. Clements
Chas. Waughop, Chief Interchange Inspector, E. St. Louis, Ill.			P. D. Galarneau
J. W. Johnson, Pyle Nat'l. Elec. H. L. Co., Chicago, Ill.			A. G. Delaney
J. E. Mehan, Asst. to M. C. B., C. M. & St. P. Ry., W. Milwaukee, Wis.			J. J. Hennessey
F. M. Gunn, Asst. to Mgr. Pullman Car Wks. Pullman, Ill.			Wm. Wright
J. W. O'Leary, Arthur J. O'Leary & Son Co., Chicago, Ill.			J. W. Taylor
H. Boyd Brydon, Sargent & Lundy, Chicago, Ill.			Jas. N. Hatch
Oscar G. Trieglaff, T. E., Ill. Central R. R., Chicago, Ill.			N. R. Maus
W. H. Wilson, S. M. P., Buffa. Rech. & Pitts. Ry., Du Bois, Pa.			J. W. Taylor
F. F. Gaines, S. M. P., Cent. of Ga. Ry., Savannah, Ga.			J. W. Taylor
R. Tawse, S. M. P., D. T. & I. R. R. & A. A. R. R., Toledo, Ohio			J. W. Taylor
A. W. Anderson, Chief Loco. Insp., C. B. & Q. Ry., Chicago, Ill.			E. C. Anderson
A. J. Poole, G. N. N., Seaboard Air Line Ry., Portsmouth, Va.			J. W. Taylor
E. A. Miller, S. M. P., N. Y. C. & St. L. R. R., Cleveland, Ohio			T. A. Lawes
Carl Schunamann, Pur. Dept., C. & N. W. Ry., Chicago, Ill.			J. L. White
Wm. E. Niles, Sec'y., Ontario Nor. & Mich. Ry., Chicago, Ill.			W. E. Symons
C. Walter Steudwell, Genl. Supt. & C. E., Nor. & Mich. Ry., Chicago, Ill.			W. E. Symons
F. E. Symons, Ralston Steel Car Co., Chicago, Ill.			Jno. L. Connors
L. F. Wilson, Assoc. Ed. Ry. & Eng. Review, Chicago, Ill.			J. W. Taylor
A. E. Schultz, Foreman, Armour Car Lines, Chicago, Ill.			A. B. Chadwick
Geo. V. Oakey, Pass. Foreman, C. & A. R. R., Chicago, Ill.			Geo. Kleifges
H. H. Waldron, S. A. Scully Steel & Iron Co., Chicago, Ill.			F. D. Graves.
C. Davidson, Supt. Ryan Car Co., Hegewisch, Ill.			H. Barnard
H. J. Quinell, Foreman, Ill. Central R. R., Chicago, Ill.			J. M. Barrowdale
J. W. Hardy, Fuel Agt., Rock Island System, Chicago, Ill.			Wm. Miller
B. R. Seabrook, Western Engineering Co., Los Angeles, Cal.			J. W. Taylor

Resigned.

Geo. James

M. F. Wise

Mail Returned.

P. T. Lonergan	H. H. Newson	A. M. Stephenson
W. R. Elden	J. E. Dickson	A. A. Kellogg
A. A. Graham	C. A. Strom	C. H. Doebler
W. F. O'Hara	H. S. Shields	Ward Wright
W. H. Judson	S. J. Robinson	

Dead.

G. W. West

Membership, January, 1909.....	1,537
Resigned	2
Dead	1
Dropped—Mail returned	14
	— 17
New members approved by the Board of Directors.....	26
	— 1,546

THE SECRETARY: This is the meeting at which we usually appoint a committee on revision of the Rules of Interchange and the President has named the following committee:

T. H. Goodnow, M. C. B., L. S. & M. S. Ry., Englewood, Ill.
 C. A. Schroyer, S. C. D., C. & N. W. Ry., Chicago, Ill.
 W. E. Sharp, M. C. B., Armour Car Lines, Chicago, Ill.
 J. W. Fogg, M. M., Chgo. Ter. Transfer Ry., East Chicago, Ind.
 H. H. Harvey, G. C. F., C. B. & Q. Ry., Chicago, Ill.

This committee should make its report at the April meeting in order that it may be considered by the Arbitration Committee of the Master Car Builders' Association which will probably meet the last of April or the first of May.

I should like at this time to give notice of the paper for the March meeting. The subject will be "Publicity for Railroad Accidents," by Mr. W. L. Park, General Superintendent of the Union Pacific Railway. Those are all the notices I have at the present time.

THE PRESIDENT: The paper of the evening was not sent out, in advance, as it was necessary to have some lantern slides. We will now listen to "The Quality of Surface Waters in the Northern Central States," by Mr. R. B. Dole, Assistant Chemist, Water Resources Branch, U. S. Geological Survey. Those who wish to can make notes and I am sure the author will be glad to reply to any questions from the members. I have the pleasure now of introducing Mr. Dole.

THE QUALITY OF SURFACE WATERS IN THE NORTH-CENTRAL STATES

BY MR. R. B. DOLE.

The tremendous importance that the mineral quality of water has attained in industrial fields led the Geological Survey several years

ago to undertake a detailed study of the quality of water, both surface and underground, and this paper presents some of the results that have been obtained in the investigations thus far. Surface waters have become widely adopted as sources of industrial supply during the last ten years and the use of boiler compounds and softening plants for treating bad water has also experienced marked increase. Yet the information regarding the chemical composition of river waters, which is so necessary for the successful purification of such supplies, has been comparatively meager, and this condition led to a study of the mineralization of the important rivers of the country in the belief that the results would be valuable to municipalities seeking water supplies and to water-consuming industries, both for the immediate application of the data thus obtained and for the bases of future, more detailed work. For purposes of this investigation about a hundred and fifty stations were established for the collection of water samples. During the period of one year at each of these stations daily samples of water, about 4 ounces in amount, were collected and were shipped to a designated laboratory. Laboratories for the examination of the samples were maintained at Brunswick, Maine, at Washington, D. C., Norfolk, Va., Athens, Ga., New Orleans, La., Urbana, Ill., Lawrence, Kansas, Iowa City, Iowa, and at Berkeley, Cal.

Ten consecutive daily samples were poured into a large bottle, and the composite thus obtained was analyzed for the substances that are usually considered to be of industrial importance. The methods of examination are not new and it is unnecessary to review them in detail. They are sufficiently accurate to yield results suitable for all ordinary purposes, and volumetric procedures were employed whenever practicable. The determinations regularly made during analysis of the composite samples of water are turbidity, or the muddy appearance of the water, total suspended solids, or weight of mud in the water, total dissolved solids, silica, iron, calcium, magnesium, the alkalies (sodium and potassium), carbonates, bicarbonates, sulphates, nitrates, and chlorine. The information furnished by these estimates makes it possible to ascertain the industrial value of the waters by computation of their incrustants and non-incrustants, their scaling, foaming, and corroding coefficients, and the cost of purifying them if treatment is necessary.

In the territory covered by the membership of the Western Railway Club about sixty stations were maintained. A few of the representative streams that were examined are given in table 1. Samples of water were collected every day for one year at each station, so that 36 analyses representing the condition of the water at each place for an annual cycle have been obtained. Besides these series, gallon samples were collected from each of the Great Lakes once a month.

TABLE 1.—SOME SAMPLING STATIONS IN THE NORTH-CENTRAL STATES

River	Location
Cedar.....	Cedar Rapids, Iowa
Des Moines.....	Kessauqua, Iowa
Grand.....	Grand Rapids, Mich.
Illinois.....	Peoria, Ill.
Kansas.....	Holliday, Kans.
Maumee.....	Toledo, Ohio
Minnesota.....	Shakopee, Minn.
Mississippi.....	Quincy, Ill.
Missouri.....	Ruegg, Mo.
Platte.....	Fremont, Nebr.
Wabash.....	Vincennes, Ind.
Wisconsin.....	Portage, Wis.

The great differences in the mineralization of the rivers and in the character of the mineral matter that they contain are very striking. Fig. 1 shows graphically the average amounts of mineral matter con-

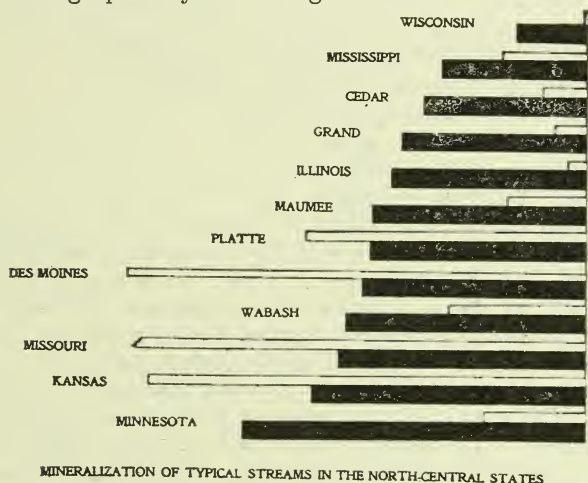


Fig. 1.

solved matter as Minnesota River, and it is practically free from suspended matter. Missouri River carries three times as much as Des Moines River and is nearly as highly mineralized as Minnesota River. tained in some of the river waters. The black blocks represent the total dissolved solids and the unshaded blocks the total suspended solids. The dissolved solids run from 480 parts in Minnesota River to 98 parts in Wisconsin River. The suspended solids are highest in Missouri River at Ruegg, 1,890 parts, and are lowest in Wisconsin River, 5 parts. Wisconsin River carries about one-fifth as much dis- The water of Illinois River at Peoria, though comparatively low in suspended solids is over twice as high in dissolved solids as water from Lake Huron.

TABLE 2.—AVERAGE COMPOSITION OF DISSOLVED SOLIDS.

	[Per Cent.]			
	Missouri	Illinois	Wabash	Lake Huron
Silica	9.0	4.5	3.9	11.1
Iron	0.2	0.1	0.1	0.0
Calcium	15.0	18.5	18.4	22.3
Magnesium	4.4	7.9	6.6	6.5
Alkalies	10.7	6.4	7.5	4.1
Carbonates	24.2	36.7	34.1	47.4
Sulphates	32.8	18.1	16.6	5.8
Nitrates	0.5	2.9	2.0	0.4
Chlorine	3.2	4.9	10.8	2.4

The rivers are different from each other not only in the quantity of mineral matter that their waters contain but also in the chemical composition of the mineral matter itself as shown by table 2. The residue obtained by evaporating to dryness water from Missouri River at Kansas City is twice as high in its per cent of sulphates as that of water from Wabash River at Vincennes, and only half as high in carbonates as Lake Huron. Many similar differences could be pointed out in the quality of the waters from the other rivers. Taking the surface waters of the north-central States as a group, they are essentially carbonated waters, in which calcium is the predominant base, but some of them, as we have seen, are far less desirable than others for boiler use. Speaking in general terms, the best boiler supplies in this territory are the surface waters of Wisconsin, the northern peninsula of Michigan, northeastern Minnesota, and the Great Lakes concerning which I shall speak later. Those containing the most incrustants occur in Iowa, Nebraska and Southern Minnesota. The streams in the western part of Mississippi Valley are usually muddier and contain more alkali than those in the eastern part.

The reasons for these differences are as evident as the differences themselves. The quality of the water of every stream is determined by the character of the region from which it comes. Since water is the greatest natural solvent and dissolves more or less of everything with which it comes in contact, these waters contain a great variety of matter in solution and in suspension and their relative purity depends on their source. The chief determining factor of the mineral content is the geological character of the drainage basin, and the influence of this factor is modified somewhat by rain-fall, by vegetation, by velocity of stream flow, and by industrial activities. We find, for instance, that the water of Minnesota River, which drains prairie regions containing alkaline rocks of the Cretaceous, is very different in quality from the water of Wisconsin River, which drains more or less deforested areas containing sandstones and crystalline rocks that are not readily soluble. The waters that come from limestone regions are hard; those that have traversed alkali tracts are alkaline; the runoff from swamps is colored and contains much organic matter, and so on. If we were to consider a larger territory, we should find even

greater differences than those in the north-central States. The river waters of Texas are widely different from those of Minnesota and the streams of Iowa are decidedly unlike those of Maine. Each water has its own peculiar composition which in turn determines the value of that water as an industrial supply.

If the difference in mineralization were a constant condition, the railroad chemist seeking good boiler water would not have his present complex problem, because he could then test the available sources of supply, select the best ones, and adjust his purifying agents to their quality. But the rivers are not constant in quality, and the series of analyses that the Survey has made demonstrate that a river at a given point changes from time to time in its mineralization far more than has been usually believed. A few figures show these fluctuations very clearly. Table 3 gives the highest and lowest contents of suspended and dissolved solids in some of the rivers during the years in which the samples were collected.

TABLE 3.—MAXIMUM AND MINIMUM DETERMINATIONS OF SUSPENDED AND DISSOLVED SOLIDS.

Source	[Parts per million.]			
	Suspended Solids.		Dissolved Solids	
	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.
Cedar R.	356	trace	311	119
Grand R.	255	3	311	191
Maumee R.	590	9	442	162
Platte R.	1,725	10	391	241
Wabash R.	656	18	504	209

The suspended matter varies more widely than the dissolved matter. Wabash River averages higher than any of the other four rivers in dissolved solids, and yet, as these figures show, it is sometimes lower than the other rivers in mineral content and therefore sometimes better for boiler use.

Although these large fluctuations in quality are constantly taking place, they seem to conform to definite laws in most rivers. The most striking relation is that between the quantity of water and the mineral content. This can be illustrated by analyses of Missouri River at Ruegg, Missouri, a few miles above the confluence with Mississippi River. The distances from left to right in Fig. 2 represent the time during which samples were collected. The distances from top to bottom represent parts per million of mineral matter for two of the curves and feet for the third curve. The elevation of the water surface in the river was read every day on the Weather Bureau gage at Hermann, 70 miles above Ruegg, and these readings have been averaged in sets of 10, corresponding to the sample periods.

It can be seen from this diagram that with a few insignificant exceptions the amount of suspended solids is proportional to the gage

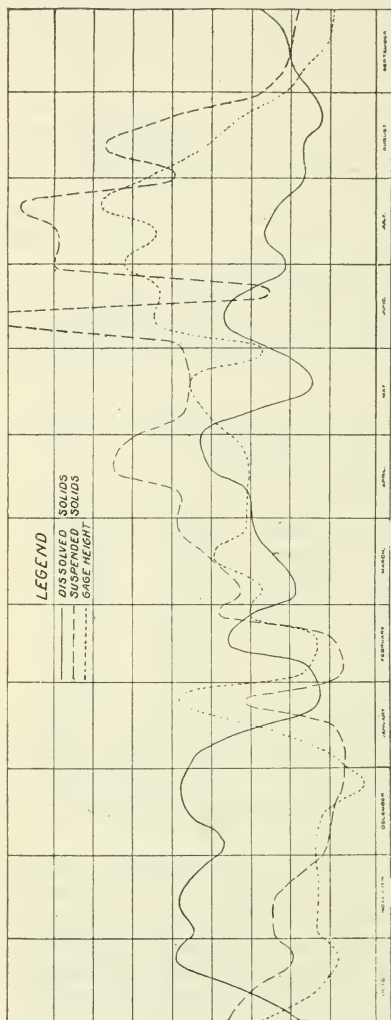


Fig. 2. Relation between gage height and mineralization of Missouri River water at Ruegg, Mo.

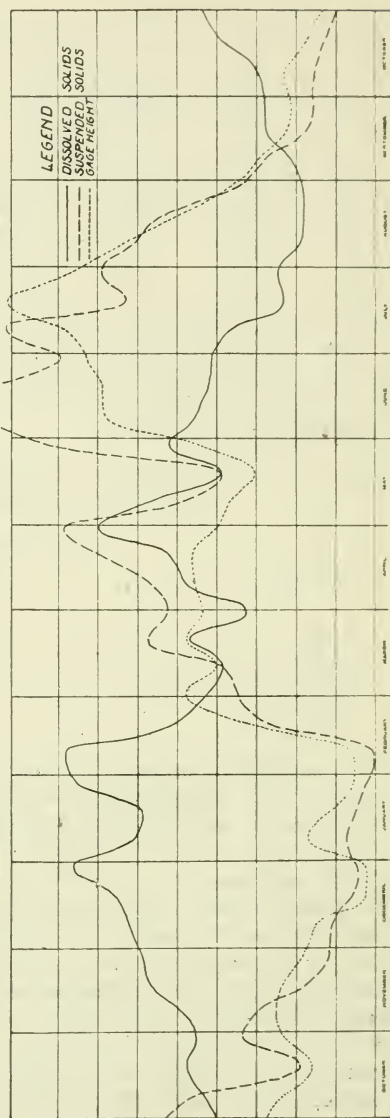


Fig. 3. Relation between gage height and mineralization of Missouri River water at Kansas City, Kans.

height. When the water is low, the amount of mud in it also is low, but when the gage height rises, the suspended matter increases in proportion. The relative amount of suspended solids carried by a given stream at a fixed point is dependent on the stream velocity at that point, because, according to the laws of hydraulics, the faster a stream

flows the greater load of sediment it can carry, and a rise in gage height is of course accompanied by a corresponding increase in velocity. While samples were collected from Missouri River, the gage showed marked rises in water stage during January, June and July, and the three rises were all attended by great increases in the amount of suspended matter. During autumn and early winter the water stage was low and suspended solids decreased in proportion. The relation between gage height and dissolved solids is usually the reverse of that between gage height and suspended solids. When gage height goes up, dissolved solids go down, and low-water stages are coincident with high dissolved solids. The lowest dissolved solids occurred in summer and the water was most highly mineralized in autumn. Part of the water in every stream is contributed by the underground flow that is constantly seeping in and this ground water is more highly mineralized than the surface water with which it mingles. Since the amount of seepage is comparatively constant, the per cent of stream flow that is derived from that source is constantly changing, usually being greatest in winter when the surface of the ground is frozen and smallest during freshets. Therefore floodwaters by diluting underground seepage cause decreases in dissolved solids. On the other hand, droughts and frozen periods, by increasing the proportion of highly mineralized ground water, increase the amount of dissolved solids in the river water.

The same relations between suspended and dissolved solids and gage height are manifest in Missouri River at Kansas City, though fig. 3 is somewhat complicated by the fact that the samples of water were collected at Quindaro pumping station above the confluence with Kansas River, while the gaging station is below the entrance of that tributary, but the same broad characteristics can be seen. The highest suspended solids and the lowest dissolved solids occur during periods of lowest river stage.

These relations between suspended and dissolved solids and gage height are more or less noticeable for all the rivers in upper Mississippi valley. In general, the smaller the drainage area and the more simple its geologic conditions, the more perfect the relations will be. They are not so nearly conditions of simple dilution on large streams that receive important tributaries whose waters are different chemical composition. They are far more constant for Allegheny River at Kittanning, Pa., with a drainage basin of only 8,700 square miles, than for Missouri River at Ruegg, with a drainage basin of 528,000 square miles. By plotting the analytical data and the gage heights of Allegheny River and then computing the equations of the resulting curves, it has been possible to deduce formulas by which the amounts of the different mineral constituents can be predicted for any stage of the river.

The changes in mineralization that a stream may undergo have important influence on the industrial application of such waters. Since

the content of incrusting, corroding, or foaming constituents may be doubled or halved within a period of two or three weeks, the economical operation of softening plants demands constant chemical control in order to produce a properly purified effluent on one hand and to prevent waste of expensive chemicals on the other. It becomes obvious that the analysis of one sample from a river does not furnish sufficient data for computing the cost of treating that water or for ascertaining its value as a source of boiler supply.

TABLE 4.—MINERALIZATION OF MISSISSIPPI RIVER.
SUPPLIES.

Station.	Suspended Solids.		Dissolved Solids.	
	Parts per million.	Grains per gallon.	Parts per million.	Grains per gallon.
Minneapolis	8	.47	200	11.70
Moline	106	6.20	179	10.46
Quincy	119	6.96	203	11.87
Menard	634	37.08	269	15.74
Memphis	519	30.35	202	11.81
New Orleans.....	600	35.09	190	11.11

A third change in the quality of river water is the alteration in its chemical composition from place to place along its course. Above Minneapolis Mississippi River receives the soft, colored waters of forest regions. It carries hardly any suspended matter and the 200 parts of dissolved solids are composed mainly of calcium, magnesium, and carbonates. At Moline the dissolved solids have been reduced somewhat but the suspended solids have been increased. Between Moline and Quincy the dissolved solids are restored and suspended solids mount higher. Above Menard the Missouri enters bringing highly mineralized, muddy water, with 1,900 parts of suspended and 350 parts of dissolved solids, and its effect on the Mississippi can be seen from the Menard figures. Suspended matter has increased to 634 parts and dissolved solids to 269 parts.

Between Menard and Memphis Ohio River enters the Mississippi. The Ohio is not so high as the Missouri in its mineral content and its diluting effect is shown by the drop in both figures at Memphis. Below Memphis some rivers with high dissolved solids enter, but their discharge is small in comparison with that of the main stream and their effect on its quality is not great. We find at New Orleans then a river bearing 600 parts of suspended matter and 190 parts of dissolved matter. From a clear stream at its source it has become a muddy one at its mouth and, though the total amount of dissolved matter has not increased, the character of its has greatly changed. Carbonates are no longer predominant for sulphates and chlorides have displaced them and the proportion of alkalies has also increased. The water has become distinctly less desirable as a source of supply for boilers or for municipal use. At Minneapolis slow sand filtration would make the water satisfactory for domestic and for boiler use. At New Orleans a purification plant costing several mil-

lion dollars has been constructed, and one of its functions is to soften the river water in order to make it suitable for industrial use.

Formerly it was common practice to procure railroad water supplies from dug wells near river banks or from collecting galleries under river beds. The reason for doing this was to avoid mud that is in the river water, for it was a common idea that the water in these wells or galleries is the surface water of the adjacent river from which suspended matter has been removed by percolation through sand and gravel. It is true, however, that this water really is the underflow of the river and that instead of coming from the surface flow of the stream it is running toward it, unless enough draught is made on the well to reverse the natural flow. It is also true that in most of the territory under discussion the surface waters are lower than the groundwaters in their content of dissolved mineral matter, so that waters from wells, though free from visible mud, are yet less desirable sources of boiler supply than waters from adjacent rivers. This point may be illustrated by the figures in tables 5 and 6.

TABLE 5.—COMPARATIVE QUALITY OF SURFACE AND UNDERGROUND SUPPLIES.

[Parts per million.]

	Des Moines, Iowa.		Fort Dodge, Iowa.	
	Surface flow.	Under-flow.	River.	Well.
Chlorine	6	12	6	110
Alkalinity	135	245	197	365
Sulphates	25	85	45	690
Incrustants	170	364	260	1,340

TABLE 6.—COMPARATIVE QUALITY OF SUPPLIES IN MINNESOTA RIVER BASIN.

	Minnesota River.		Average of 100 Wells.	
	Parts per million.	Grains per gallon.	Parts per million.	Grains per gallon.
Silica	23	1.34	...	.....
Iron	0.09	.00	...	.....
Calcium	82	4.80	157	9.18
Magnesium	35	2.05	60	3.51
Alkalies	23	1.34	78	4.56
Bicarbonates	296	17.30	503	29.42
Sulphates	144	8.42	332	19.42
Nitrates	2.0	.12	...	.....
Chlorine	4.7	.28	35	2.05
Dissolved solids.....	480	28.07	941	55.03
Incrustants	322	18.82	593	34.64

The city supply of Des Moines, Iowa, is taken from collecting galleries in the alluvium under Raccon River. Samples of water taken on the same day from the galleries and from the river itself yielded the analytical results just quoted. The river water is good but the underflow is only fair for boiler use. Comparative analyses of water from Des Moines River and from a shallow dug well beside the river at Fort Dodge show the difference even more clearly. The river furn-

ishes good boiler water but the well water is very bad. In table 6 the average quality of Minnesota River at Shakopee, a few miles above its mouth, is compared with the average of 100 analyses of waters from the drift in all parts of the basin. These figures show the broad general differences between the chemical composition of the surface drainage from 15,000 square miles and the chemical composition of the underground water in the same territory. It is understood that several railroads in the last five years have substituted surface waters for many of their well-water supplies as a result of investigations conducted by their chemists, who have demonstrated that the surface waters are superior to the ground waters for boiler use.

The railroads that can take locomotive water from the Great Lakes are particularly fortunate, for these bodies of water afford supplies that are much softer than the waters of their tributaries or the groundwaters around them. They are also practically free from suspended matter and are almost constant in their mineralization; that is, they are different from each other in chemical composition, but they do not fluctuate in quality from month to month so much as river waters do. The reasons for this comparative steadiness in concentration are probably the absence of large tributaries and the low ratio between the areas of the drainage basins and the lake surface. Table 7 shows the average quality of the waters of the Great Lakes.

TABLE 7.—THE AVERAGE QUALITY OF THE GREAT LAKES.

[Parts per million.]

Source	Lake Superior.	Lake Huron.	Lake Michigan.	St. Lawrence River.	Lake Erie.
Turbidity	2.	trace	trace	4.5	41
Silica (SiO ₂)	7.4	12	10	6.6	5.9
Iron (Fe)	0.06	0.04	0.04	0.05	0.07
Calcium (Ca)	13	24	26	31	31
Magnesium (Mg)	3.1	7.0	8.2	7.2	7.6
Sodium and potassium.... (Na+K)	3.2	4.4	4.7	6.3	6.5
Carbonate radicle (CO ₃) ...	0.0	1.8	2.9	2.9	3.1
Bicarbonate radicle (HCO ₃)	56	100	112	116	114
Sulphate radicle (SO ₄)	2.1	6.2	7.2	12	13
Nitrate radicle (NO ₃)	0.5	0.4	0.3	0.3	0.3
Chlorine (Cl)	1.1	2.6	2.7	7.7	8.7
Total solids	60	108	118	134	133
Salinity	58	108	117	131	132

Lake Superior is least strongly mineralized. Lake Michigan is twice as high in total solids, and Lake Huron is only a little less strongly mineralized than Lake Michigan. The samples from Lake Michigan, since they were taken from the Straits of Mackinaw, probably do not represent the mineralization of the lake at Chicago or Milwaukee because of dilution by water from Lake Huron. Lake Erie and Lake Ontario are practically alike in their mineral content, having about two and one-half times as much solids in solution as Lake Superior. The chief reason for this constant difference in min-

eralization is the dissimilarity of the geologic formations in the basins tributary to the lakes. Around Lake Superior igneous and crystalline rocks predominate. Granite, schist, gneiss, and basalt occur in great abundance—rocks that are hard and difficultly soluble. Lake Michigan and Lake Huron on the other hand are affected by the drainage from limestones and sandstones of the sedimentary series, and as a result their mineralization is greatly increased. Lake Erie in its increased mineral content evidences the continued effect of calcareous, sedimentary formations. Lake Ontario, being small in comparison with the rest of the system and being surrounded by formations similar to those around Lake Erie, does not have much effect on the concentration of the effluent and may be regarded as merely an expended outlet of Lake Erie. The nature of the dissolved constituents in all the lakes is such that the waters can be used for boilers and for most other industrial purposes without purification. The small amount of sulphates, chlorides, and suspended matter especially recommends the waters for boiler use whenever they can be economically obtained.

In the last two decades notable changes have taken place in certain features of railway maintenance and operation. The purchase of supplies on contract has caused the up-building of testing laboratories, in which trained engineers, chemists, and physicists bring their knowledge and ability to bear on increase of efficiency, and one of the many problems that have been attacked by them is that of water supply for locomotives. The old hit-or-miss methods of picking out water stations have been replaced by scientific study of available supplies and selection of the best ones. Several roads have softening plants in operation for their worst supplies, and before many years it will be a firmly established principle that it is more economical to remove impurities from feed waters before they enter boilers than to blow, bore, pound or shovel from the inside of the boilers.

In selecting the good water supplies and in adapting purifying agents to bad ones, information regarding the chemical composition of the waters is essential and the practical value of the water investigations made by the Geological Survey is shown by the data furnished along these lines. We have seen that underground waters are usually more highly mineralized than surface waters in the same vicinity and they are, therefore, less desirable as boiler supplies. We have seen also that surface streams differ greatly from each other in their mineral content, that a given stream changes in mineralization from place to place along its course, and that a given stream is subject to notable fluctuations in quality at a given place. Railroads are more fortunate than many other water consumers in one respect; a factory is situated in one spot in the selection of which the quality of available water supply is too frequently a minor consideration; consequently, the factory boilers must be furnished with water from sources in the immediate vicinity, be they good or bad; but since the

railroad steam generator is movable, considerable latitude can be allowed in choosing railroad water supplies. If the water at one point is bad, the water tank can be located a few miles farther up the line. As rivers fluctuate in quality, a supply that is ordinarily good may become temporarily inferior to another one nearby which may be used until normal conditions are restored. Intimate knowledge regarding quality of water conditions along the right of way permits many economies that would otherwise be impossible.

THE PRESIDENT: We have quite a number of members of the Club present who have made a study of the water question, but before calling on them for a discussion of the paper it might be well to give those who desire, a chance to ask Mr. Dole any questions they wish.

The paper has been so logically and graphically presented that there may not be many questions left on the paper itself, but possibly it may have suggested some questions that pertain to your railroad experience, or to troubles that you have had for which you could not account. Perhaps no one has gone further and been more successful in water treatment than Mr. Davidson of the North Western. We will be glad to hear anything that Mr. Davidson can add to the discussion.

MR. G. M. DAVIDSON (C. & N. W. Ry.): I do not know that I have anything further along the line of the paper of this evening, except by an explanation as to why some of our western railroad locating engineers are inclined to obtain water for locomotive use from wells instead of running streams. Most of the streams flowing through the western prairies are shallow and carry a great deal of mud in suspension. In the winter time they are frozen over so that they are practically solid ice, and the railroad engineers naturally go to wells. As a rule they do not consider the importance of soft water as much as they do the quantity of the water, and they get plenty of water from wells, and get it at all seasons of the year.

In recent years, it has been found that muddy water can be economically clarified, at the same time softened, if it is necessary, so that in our territory at least we do not put in any more wells than we have to.

As illustrating the point brought out by the speaker of the pits dug along the banks of the river which are supposed to contain water running back into the pits from the river, I recently had that brought to my attention by a sample of water sent me representing Mississippi river water. I have made a good many analyses of Mississippi river water in the last twenty years, and this particular sample had three times as much solid matter as any former analyses that I had made of Mississippi water. I was somewhat puzzled at the time, until I investigated and then I found that a pit had been dug along the river bank and lined with brick and had entrapped the water that was flowing toward the river instead of the river water, and the water

flowing toward the river was very much harder than the natural river water.

The water that we get in the State of Iowa, especially in the Northwestern portion of the State, comes from the cretaceous formation underlying Northern Iowa and Southern Minnesota, and contains a large quantity of carbonates and sulphates of lime in solution. The rain falling along the upper portion of the stream seeps into the ground, dissolves these compounds of lime, carries them along, and whenever you get a shallow stream or a well in that territory, you are apt to find water in it that is very hard.

The analysis that interested me particularly this evening was the one from Fort Dodge. Fort Dodge is in Webster County, and Webster County is headquarters for the gypsum industry and gypsum is sulphate of lime, so that any well that is in that locality that I know of, contains a large quantity of sulphate of lime, due to there being enormous quantities of sulphate of lime in the ground and it being more or less soluble in the water.

I think the speaker of the evening has presented the subject in a very able manner, and I am sure we have all learned from him a great deal on this subject.

THE PRESIDENT: I think it might be well to get the views of men who have to contend with practical troubles that bad water furnishes, and I believe Mr. Jeffries who is a locomotive engineer can probably give us some idea of what they amount to.

MR. B. H. JEFFRIES (Wabash R. R.): I do not think that is a part of the subject that needs much explanation. I think most of us know what bad waters will do; they do damage in several ways. However, the principal point tonight seems to be the damage caused by incrusting matter. There has not been much said on the priming question.

I had a little experience a year or so ago that rather baffled me, and an explanation would be pleasing to me if somebody here can give it. I took a tank of water about eighty-seven miles east of here; the water came from a shallow lake amounting almost to a swamp; the engine had been doing nicely, carried the water well, but after leaving there, and had gone about five or six miles, it commenced to raise that water and the farther we went the worse became the conditions. There was no foaming, the water was perfectly solid in the glass, but she simply raised it, and kept getting worse and worse. We finally reached a point where it was impossible to open the throttle at all.

I reached the next water tank by drifting and stayed there an hour changing the water in the boiler. I met another train between that tank and the place where I had stopped and of course sent a message to them to take as little of the water as possible; they had taken half a tank of it before they got the message, and they went to the next tank and did likewise. Of course I appreciate the fact that that water was full of organic matter, but it was my first experience in

seeing water that was just simply raised out of sight and raised solid with no sign of foaming, or the suds condition that you generally see. It was a new experience to me. There is no question but that it contained a lot of organic matter, but what else there was in it I would like to know.

There is another question I would like to ask. In taking these samples of river water, were the samples taken from the middle of the river, on the surface near the center, or down near the bed of the river? I understand there is some difference in river water as to where the water comes from.

MR. DOLE: Mr. Chairman, in regard to taking samples I would say that they were taken at different points in different rivers; but in a given river they were usually taken at one point, and that point was the most convenient one. Where there were intake pipes, we got the water from that intake, because it represents water far enough below the surface to get rid of local conditions, dirt, etc., and also because it represents a supply that is used industrially. At a great many sampling points the Geological Survey had gaging stations located on bridges or on dams, and it was possible to get water from the main current in the middle of the stream either by walking out on the dam or by lowering the bottle in a suitable receptacle from the bridge. In every case it was endeavored to get water from the main current of the river, not back-water along the banks nor the water containing matter in saltation at the bottom of the river, nor the water including floating particles, but a representative sample of water. Now then, if we select one place in the current of the river for taking a sample and take a sample at that one point for three hundred and sixty-five days under all conditions of flow, it is pretty fair to assume that the average of all those samples represents the average condition of the water though one sample might not represent the average condition of the water on a given day.

The samples from the Great Lakes, however, showed rather interesting conditions, being taken from bodies of water that do not, comparatively speaking, flow. The samples were taken at the outlets as near a flowing condition as possible, but when we had finished the analysis, we found that the lakes vary in quality, the content of total solids fluctuating as much as 12 per cent. That is not very high when we compare it with ordinary streams because even the Mississippi at New Orleans fluctuates in a year nearly 50 per cent in its mineralization, yet a fluctuation of 12 per cent is appreciable. When we started to find the cause of it, we compared the elevation of the water surface with the analyses and we found there was no constant relation whatever, sometimes the highest mineralization was at the times of highest water and sometimes the exact reverse was true. We then compared the rainfall of the regions where the samples were taken with the analyses and found a constant relation. When there was a heavy rainfall the solids were lowest and when there was a

drought the solids were highest. So it seems probable that local rains dilute the upper strata of the lakes and that samples of water, even when taken from the narrow lake outlets may reveal the effects of such dilution.

THE PRESIDENT: Possibly some one here can explain, or offer a solution of Mr. Jeffries' trouble. Mr. Wickhorst, what would you suggest as the difficulty?

MR. M. H. WICKHORST (C. B. & Q.): I do not know, Mr. President.

MR. JEFFRIES: I might add, that this water was green; it looked like green ink.

THE PRESIDENT: Mr. Wickhorst, can you offer us anything in the way of interest pertaining to the paper?

MR. M. H. WICKHORST (C. B. & Q. Ry.): I think the Club is indebted to Mr. Dole for a very valuable contribution and for some generalizations on this subject which we are glad to get. We have noticed the very material differences in the quality of surface water and of wells right beside the river bank and we have done quite a little work in changing over from wells to surface water.

Taking the C. B. & Q. Ry., for instance, starting from Chicago westward, we find through Illinois the waters all contain more or less of what we call sulphate hardness, that is, gypsum, calcium sulphate. In Iowa, the amount runs somewhat lower; through Missouri it is about the same as through Illinois. When we get over into Nebraska, however, most of the waters are good boiler waters; that is, the waters contain a little free sodium carbonate, or soda ash, which we use to treat water with. Up in the Northwest, from Edgemont, S. D., up to Sheridan, Wyo., we are right up against the water problem, and there we have water so heavily loaded with gypsum that we do not dare to treat it on account of the resultant, or else we have water so full of alkali already that we can hardly do anything with it.

I want to dwell more particularly upon water from the encrusting standpoint. The thing we really have to look out for and try to overcome in water, is the sulphate hardness, the gypsum in the water; we do not care so much about the calcium carbonate, that does not bother us so very much, but we do have to treat for the sulphate of calcium. Even if there is only a small amount of sulphate of calcium in the water originally, it accumulates in the boiler and finally makes just as hard a scale, and as thick a scale as if there were considerable of it, and we may have quite as much trouble with that kind of water. What we aim to do, as far as we trouble with the matter at all, is to treat the water with enough soda ash or sodium carbonate to combine with the calcium sulphate, and leave in the water free sodium carbonate to the extent of about fifteen or twenty per cent of the dissolved solids. The calcium sulphate forms a very hard scale, calcium carbonate forms a loose scale and by treatment with soda ash, in suitable quantity, all the scale formation is avoided. We

get the scaling material all down as mud or sludge, the influence of the soda ash on the carbonate being to cause quick precipitation and so in that way to avoid the loose scale also.

Right here I want to differ a little bit from the statement the speaker made as to the advisability of not letting all the incrusting matter go into the boiler, that is, throwing the scaling matter out before it gets into the boiler. That is perhaps true when we have to deal with large quantities of lime, but taking water as we have ordinarily all through Illinois, Iowa, Missouri, Nebraska, Wisconsin, the water generally is such that it is quite sufficient simply to dope the water with soda ash and let it all go into the boiler and blow it out. As far as the maintenance of the boiler is concerned, the results are quite as good. The important thing is to add enough soda ash so that the dissolved solids in the boiler contain about 15 to 20 per cent free soda ash. The material is all then put into a sludge which the circulation carries into the back part of the boiler where it can readily be blown out. We have found that wherever treatment with soda ash, or, for that matter, any other material, is carried on, very heavy blowing out is necessary to keep down the solids in solution and while there is some increase in suspended matter, it apparently does not add sufficiently to the foaming to warrant the expense of removal beforehand. We find where water is so treated and blowing out is carried on properly, a boiler can be run almost indefinitely without washing; we can run a boiler several months, and as a matter of fact, in a limited territory, we do run boilers a month by depending entirely upon blowing out.

THE PRESIDENT: One of the roads, I believe which first started treatment of water for locomotive boilers was the Chicago, Milwaukee & St. Paul Ry. We have here tonight Mr. Prentiss of that road, and we would be glad to hear his experience.

MR. G. N. PRENTISS (C. M. & St. P. Ry.): I do not feel that I can add very much to what has been said by previous speakers, but we did find in case of the Missouri river where we sunk test pits in the bed of the river, that the underflow was very much more mineralized than the river water itself, and we at first believed that that was due to currents from some of the deep artesian wells, but on considering the matter further, changed our opinion.

We found too, as Mr. Wickhorst has stated, that a little more than the necessary amount of soda ash seems to be a good thing for boilers.

As to waters of the North Central States, whv, we do not have a great deal of trouble, our principal state being Wisconsin, where we have the best water of all. The Wisconsin river particularly, furnishes as good water as we have anywhere on the system.

In Minnesota, I may say that there seems to be an exception to the statement that river waters are better than well waters. Along the Minnesota river, at Montevideo and Appleton, the river water is quite bad, has from ten to fifteen grains of sulphate of lime and quite

an amount of carbonates. We have wells in that vicinity that go down, well, not below one hundred feet, where the water contains only carbonates of lime and magnesia and alkali carbonates, sulphates and chlorides. The trouble there is that we cannot get as much of that water as we really need.

Farther west, along in the eastern part of South Dakota, the shallow wells become very hard, in fact, in some instances even run seventy-five grains of sulphate of lime to the gallon. Farther west still, we get the alkaline waters, that is, where there is very little lime or magnesia, but large amounts of carbonates, sulphates and chlorides of the alkalies. In the past five or six years we have found that we can use such waters. The total solids of the artesian well waters will run about a hundred and twenty-five grains per gallon and five or six years ago we did not believe we could use them on account of priming and foaming, but we have found since then that we can control that condition. Where we were using the hard waters and flues were only lasting eight to twelve months, we now use these alkaline waters. One engine in particular which we have kept washed out carefully, has not had the flues changed in about seven years. The engine runs from Andover in South Dakota to Harlem in North Dakota, and the flues I believe were in for two and a half years, may be three, before she was put on that run and she has been running there continuously since and there has been almost no boiler work on her on account of the water. We are looking now for these alkaline waters between Aberdeen and Mitchell; almost along the entire line we find those waters and intend to use them. We are using them now between Aberdeen, S. D., and Edgeley in North Dakota, and it has helped us very much indeed. We feel very much encouraged in that line. The sheets and flues all seem to be absolutely clean.

PROF. E. C. SCHMIDT (University of Illinois): Supplementing the remarks of the last speaker, it may not be inappropriate for me to refer here to the results of about 750 analyses of boiler waters which have been made at the University of Illinois. These water examinations have been made, during the last seven or eight years under the direction of Professor S. W. Parr of the department of chemistry, and the State Water Survey. Of the 750 waters examined approximately 650 proved to be suitable for boiler purposes and contained less than fifty grains of solids per U. S. gallon. These waters were collected throughout the Mississippi valley and may be taken as fairly representative of the waters usually obtainable in this section of the country.

A study of the analyses reveals the interesting fact that they fall naturally into two groups. The first group is characterized by the presence of free sodium carbonate (soda ash) in solution, and as a consequence these waters contain no sulphates of lime or magnesia. The second group has no sodium carbonate in solution and does contain sulphates of lime and magnesia, the materials which produce

hard scale. The waters of both groups contain varying amounts of the carbonates of lime and magnesia which in the boiler are thrown down as sludge; this, as Mr. Wickhorst has pointed out, is not, however, so very troublesome.

Of the 650 waters referred to above, 261, or forty per cent., belong in this first group; that is, they contain free sodium carbonate and no sulphates of lime or magnesia. This sodium carbonate occurs in amounts varying from one to twenty grains per gallon and when, in locomotive service, such waters are mixed with other waters containing sulphates they will have a beneficial action in preventing the formation of hard scale by the latter. Waters with the higher content of sodium carbonate may however induce foaming if not frequently blown off. In general the waters in this group are excellent boiler waters and require no treatment except intelligent boiler washing and blowing off. Almost all the waters in this group come from wells eighty feet or more in depth.

The waters of the second group constitute sixty per cent. of the 650 analyses. These waters contain the sulphates as well as the carbonates of calcium and magnesium and consequently ought to receive some treatment when used for boiler purposes, in order to alter or remove these sulphates.

We may sum them up as follows: Of the 750 waters examined about thirteen per cent. were unfit for boiler purposes, thirty-six per cent. were good boiler waters, requiring no chemical treatment, and the remaining fifty-one per cent. are suitable for boiler purposes; but require some chemical treatment, although in many cases sufficient treatment may be obtained by the use of soda ash on the engine. The figures seem to indicate that the situation concerning water supply for locomotives throughout this central western territory is not quite as bad as we are sometimes led to believe. I may add that Professor Parr has in preparation a bulletin to be published by our Engineering Experiment Station, in which the results of these analyses will be given and discussed in detail.

PROF. L. E. ENDSLEY (Purdue University): I can say that in the experiments with the first locomotive at Purdue, which used 130 and 140 pounds steam pressure, the water was taken from a well 109 feet deep. The boiler was blown off and washed out frequently and practically no scale was found which could not be washed out. In the experiments on the present locomotive at Purdue, the boiler of which is designed for 250 pounds steam pressure, the water is taken from the same well. A great many tests have been made at 225 and 240 pounds steam pressure, as well as at lower pressures, during which the boiler has been treated in about the same manner as the one on the first locomotive, with the result that a much harder scale, which cannot be washed out, has been formed in the boiler. This may be due to the fact that the softer scale is precipitated in the injector and branch pipe leaving only the harder scale to form in the boiler.

The amount of soft scale which will form in the injector branch pipe when running under a pressure of 240 pounds is very great, there often being three-sixteenths of an inch in a 4-hour run. This deposit of soft scale in the injector pipe never occurs when running under a pressure of 180 pounds or less, neither does it occur at pressures below 200 unless the injector is throttled. But it does occur at 240 pounds pressure with the injector wide open. This is due to the high temperature of the water as delivered from the injector.

THE PRESIDENT: Mr. Seley, I believe the Rock Island has been using some low boiler pressures, have you noticed any trouble in the direction Prof. Endsley refers to?

MR. C. A. SELEY (C. R. I. & P. Ry.): I do not know that I have any information, Mr. President, in regard to the effects of low boiler pressures. I had in mind that the general proposition was to reduce the cost of boiler maintenance from leakage due to the effects of scale. As to the development of the amount of scale produced by different pressures, I have no information.

MR. W. E. SYMONS (Member): We are very fortunate to have had so interesting a paper this evening on this question of boiler waters, and waters in general, and it is rather unfortunate that the results of the analyses here shown were not placed in the hands of railway companies years ago so they could have acted on the information thus obtained and thereby materially reduce the \$30,000,000 expense that they now suffer as the result of bad water in the way of lack of proper steaming qualities of boilers, due to incrustation, and the expense of not only removing the scale, but repairing the boilers.

The question of mineralization of waters which has been so ably treated by the author is one that is well worthy of our attention. It should be borne in mind however, that the railway officers who provide, or use waters for locomotive boilers, have not always been free to act in a manner that would afford relief from conditions as they found them, while in some other cases they were not aware of the real conditions that existed and were forced to learn by experience—and the experience thus obtained has always been a rather expensive schooling, the tuition fee has usually been very high.

I recall an instance some years ago on a road in Mexico with which I was connected where a set of flues would only last about sixty to ninety days on account of using water that was very brackish or salty, this being near the Gulf of Mexico. We went up the Panuca river, some few miles from its mouth, to get what we considered soft water and, due to the time honored custom of railroad or maintenance of way officers, we placed our suction down in the river so that we would be below dangers of low water.

The result was that after spending many thousands of dollars running a water main up the river, we were not much better off than when using the water taken from the river down near the gulf shore. We began then to experiment to learn the cause, and found

the water highly mineralized, and that the mineralization was in stratas or layers. During high tide, salt water from the Gulf, which was highly impregnated with salt, was backed up several miles from the mouth of the river, and the soft water coming from the mountain streams and low lands that was heavily laden with organic matter was flowing over the top, or surface layer, of this body of salt water. After considerable experimenting and just before abandoning our pipe line and pumping station, we changed our suction, attaching it to a float anchored out in the river, so that we took our supply of water from a point not over twelve inches from the surface and we found a difference in the incrustating solids, in grains per gallon of about 100 per cent.

Another experience somewhat similar to the above may throw some light on, or serve to partially explain the trouble Mr. Jeffries experienced with bad water in his locomotive boiler. This occurred some twenty odd years ago when I was acting in the capacity of engineer on a river steamer on the Colorado River. The captain of the steamer advised that at a certain point up near the mouth of the Grand Canyon there was a very swift current or rapids at a point where there was quite a drop in the water level making it very difficult for a boat to ascend the stream except at certain known water levels. This condition was also aggravated at certain periods by the boilers on the boat foaming badly, this being caused by certain deposits in the water which came from the Little Virgin river in Southern Utah, and when the water from this river, which was of a very reddish color was flowing into the Colorado river in any considerable quantities it caused the water to foam or prime so badly that it was well nigh impossible to attempt to run, or force the boat over the rapids. On reaching this point we found, as the captain had predicted, that the Little Virgin river water was flowing into the Colorado in considerable quantities, the result being after several ineffectual attempts to run the rapids we were forced to abandon our efforts, and "*lay-to or tie up*," for about a week or ten days or until the bad water from the Little Virgin river ceased to flow in sufficient quantities to affect the operation of our boilers. In the meantime, while awaiting a change in the character of the water our boilers were thoroughly cleaned by the blowing and washing out process. Some years later when taking service in charge of the Motive Power Department of a certain railway, I found contracts already prepared and ready for execution by the proper executive officer covering the construction of some water treating plants. These contracts were passed to me to look over with instructions to say if they were satisfactory, if not, to offer suggestions, criticism, etc. I observed one of the stipulations was that the water after treatment should handle equally as well in the locomotive boiler as before treatment. I included an additional guarantee as follows:

"That each of the waters treated were to handle equally as well

after treatment as before, and that when any of these waters were mixed with any of the other waters on the line of the company's railway they were to handle equally as well following these mixtures as either of them did before." The water softening company declined to execute this contract, which I consider as equivalent to an admission on their part that when treated waters were mixed with other water probably the engines would foam as badly or worse than before, rendering them more difficult to operate than before treatment.

If all of the information that the author of the paper has given us this evening, were placed properly before railway officers, it would then be quite easy to avoid many of the expensive experiences, that we have not only had in the past, but are having now, and in many instances are paying a very high price for. Water for locomotives has been viewed in many instances not unlike the coal furnished for fuel, in that it has been considered principally from a standpoint of quantity only, the quality having been lost track of, and when locomotives have been supplied with a sufficient amount of water in gallons, and a sufficient quantity of coal in tons, it has been thought there was no reason why they should not render one hundred per cent. efficiency in service. That of course is a fallacious view to take, but the officers and employes of the operating department have been laboring for years under that disadvantage.

My memory is not very good, but if not mistaken there was a very able report by a committee of the Railway Master Mechanics' Association in 1905 on the question of water softening plants, and among other things they were very emphatic in their conclusions that, where it is possible to do so, water should be treated prior to its delivery to the locomotive. They also pointed out that much benefit could be derived by individual treatment on the engine where roads could not provide softening plants, and in the discussion which follows on this report it was pointed out by some of the members that marvelous results had been obtained by treating water locally on the engine, in that it not only increased mileage made by the engine thus using it, but that the expense of repairs to boilers was materially reduced and the engine much improved in steaming qualities. It therefore might be reasonably assumed that the Master Mechanics' Association favors water softening plants, but where these are not within the range of possibilities the next best method to follow is to treat the water on each engine.

In connection with this I would like to ask the author if he feels so disposed (in his closure) to kindly indicate if in his opinion local treatment of the water of each locomotive does not produce sufficiently good results to justify the practice. This of course it is assumed would be followed where it was not possible to have treating plants. I would also be glad to know, if in the author's opinion water is not sometimes made entirely too pure; in other words, if the treatment does not sometimes cause it to foam worse, or become more

difficult to handle in the locomotive boiler than before treatment, thus necessitating the use of some other agency that would tend to improve its conditions, using, of course, such agency for this purpose as the analysis of the waters would indicate was best suited to secure these results.

THE PRESIDENT: Is there any one further who wishes to speak on this subject? Are there any members from the Dearborn Drug & Chemical Works present this evening? They have had large experience with the treatment of water.

MR. W. A. CONVERSE (Dearborn Drug & Chemical Works): I have listened to this able and instructive paper with very great interest, and many points have been brought out here which are of exceptional interest to me. The point that was raised by Mr. Jeffries as regards the experience he had, has been brought to my notice at three different times within the past few years, where there seemed to be an uplifting bodily of the water contained in the boilers, and no indication of the ordinary condition which we understand or know as foaming. In two of these cases, both being in locomotive service, the analyses of the two waters showed two extremes in a way. One of them carried not a very large percentage of solid matter in solution, but the greater portion (about seventy per cent. of the total amount) was salt, and this trouble did not occur until the concentration had increased very materially. The other case was where a mountain stream water was used that carried less than two grains of solid matter. There seems to be a general tendency on the part of pure waters, not to foam, but under many conditions to lift bodily and carry over in the form which we call priming. The third which is in a stationary plant, is one which is under advisement at the present time. The water is Lake Michigan water, taken from the city main, and the same difficulty is being experienced and serious trouble on two occasions recently has been barely avoided. This, of course, is attributable, in my judgment, to a mechanical condition, as Lake Michigan water is of such a nature that in my experience of several years, an action of this character was never brought to my notice before, where water from this source was being used.

The general subject of water treatment is of course a very interesting one to me from every point of view: and there was another point raised as regards the hardness of scale formed from a water containing encrusting solids in the form of carbonates: that is, carbonates of lime and magnesia, and being devoid of sulphates of calcium or lime. I am strongly of the opinion that the hardness of the scale formed from strictly carbonates, that is, carbonates of lime and magnesia, is not dependent upon the presence of sulphate of lime at all times, but is due to the amount of said carbonates which the water carries. In fact, Lake Michigan, which carries a small percentage of sulphate of lime as compared with other waters, gives a much harder scale than many waters carrying more sulphate of

lime; and in some of the most dense and hard scales that I have had the opportunity of analyzing, the absence of sulphate of lime was absolute, so far as possible to determine. In other words, they were composed entirely of carbonates of lime, and magnesia, largely in crystalline form, and I have seen samples which were so hard and tenacious that it was almost impossible to remove them from the metal to which they were attached, and they were almost hard enough to cut glass. The last statement is possibly a little exaggerated, but they were very hard.

MR. WILLIAM FORSYTH (Railroad Age Gazette): I am surprised to hear the railroad chemists this evening say that they are able to use alkali waters in locomotive boilers without much trouble, because my general impression has been that they were very troublesome and that chemists had about given up all attempts to treat them. If some change has come about in this practice, I should like to have the chemists tell us just how they do it.

THE PRESIDENT: Mr. Bonnell, can you give us any additional information to that furnished?

MR. F. O. BUNNELL (C. R. I. & P. Ry.): I do not know that I can add any information. I have been greatly interested in the paper by Mr. Dole this evening; I think it is instructive in many ways. The handling of priming in water is, I believe, largely a matter of properly blowing out an engine. The foaming tendencies can be handled to a great extent by some compounds which can be used, but so far as treatment in the manner that we ordinarily consider treating of water is concerned, I do not know of any way in which it can be done. I think perhaps Mr. Wickhorst has had more experience than I have had on that subject.

THE PRESIDENT: If there is no further discussion, we would like to have Mr. Dole add anything that he wishes to his preceding remarks.

MR. DOLE: Mr. Chairman, I should like to say, first of all, that it has been a great pleasure indeed to me to come here and listen to practical remarks by practical men. We who work in laboratories often get ourselves so thoroughly involved in chemicals, figures and statistics that we forget there is a practical side to these things, and it does us good to come here and get another point of view.

One of the gentlemen who spoke mentioned the hope that the government would endeavor to save the railroads some part of that thirty million dollars a year, and that gives me an opportunity, which I hoped I would have, to say that the five thousand complete analyses of surface waters which have been made in the last three years are now in manuscript form and will be printed as a water supply paper of the Geological Survey for distribution this spring. I hope that all the members of this Club who are interested in water supplies will ask for copies.

MR. SYMONS: I wish to say to the author of the paper that I want to put in an application for the first copy of his book.

I believe I voice the sentiment of the officers and members of this Club in saying that we highly appreciate the paper we have listened to this evening and I move that a vote of thanks be tendered the author of the valuable paper and his able discussion that followed.

THE PRESIDENT: It has been moved and seconded that a vote of thanks be passed by the members and officers of the Western Railway Club to Mr. Dole for his contribution to our proceedings and the very able paper that has been presented this evening. I think we will just take a rising vote on that. All in favor of the vote please rise. It seems to be unanimous, Mr. Dole.

If there is no further business presented, I will declare the meeting adjourned.

Adjourned.

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The regular monthly meeting of the Western Railway Club was held at Assembly Hall, Fine Arts Building, on Tuesday evening, March 12, 1909, President M. K. Barnum in the chair. The meeting was called to order at 8 P. M. Of those present the following registered:

Adreon, E. L.	Fitzmorris, Jas.	Maltby, Geo. B.
Allen, G. F.	Foley, J. J.	MacKenzie, D. R.
Arlein, E. J.	Fogg, J. W.	Markham, J. T.
Baker, F. L.	Furry, F. W.	McCormick, A.
Barnard, H.	Furry, W. S.	Melville, L. B.
Barnum, M. K.	Goodnow, T. H.	Meeder, W. R.
Batten, P. H.	Gowing, J. P.	Miller, F. W.
Bickel, A. M.	Hahn, F. W.	Midgley, S. W.
Bigelow, O.	Harkness, F. L.	Mills, Geo. F.
Bogard, P. B.	Hayward, O. C.	Moore, A. C.
Borrowdale, J. M.	Henderson, T. D.	Morris, W. L.
Callahan, J. P.	Hewett, C. H.	Motherwell, J. W.
Carman, C. A.	Holmes, S.	Monroe, M. S.
Christenson, A.	Hopkins, G. H.	Nathan, C. A.
Coleman, J.	Humphrey, A. L.	Neff, J. P.
Connelly, W. L.	Hungerford, L. S.	Neely, B. J.
Cooke, W. J.	Hurley, J. D.	Olmstead, C. J.
Cota, A. J.	Jeffries, B. H.	Peck, P. H.
Covert, M. F.	Jett, E. E.	Peck, C. L.
Cram, T. B.	Jones, E. F.	Price, R. C.
Crawford, J. G.	Jones, L. E.	Rosser, W. W.
Davidson, C.	Kelly, J. W.	Rehmeyer, O. H.
De Voy, J. F.	Kucher, T. N.	Richards, R. C.
Dewar, John I.	LaRue, H.	Rowley, S. T.
Dewey, L. R.	Lewis, B. T.	Royal, Geo.
Dickinson, W. H.	Lewis, J. H.	Seley, C. A.
Dodd, T. L.	Lickey, T. G.	Seyfarth, E. E.
Elliott, P. M.	Lovell, C. P.	Sharp, W. E.
Erb, J. F.	McAlpine, A. R.	Symons, W. E.
Ewing, C. J.	Macpherson, A. F.	State, R. E.
	McClain, H. O.	Stephens, R. V.

Stimson, O. M.
 Stevenson, R. W.
 Stott, A. J.
 Stuart, J. R.
 Squire, W. C.
 Tawse, W. G.
 Taylor, J. W.

Tinker, J. H.
 Thompson, J. R.
 Thompson, Slason.
 True, C. H.
 Waldron, H. H.
 Ward, D. O.
 Willcoxson, W. G.

Wilson, L. F.
 Winslow, H. L.
 Whiting, Geo.
 Wright, M. T.
 Wright, Wm.
 Woods, A. C.
 Woods, E. S.

THE PRESIDENT: I will call the meeting to order and we will listen to the report of the Secretary. The proceedings of the last meeting have been printed and distributed, and unless there are some corrections to be made they will stand approved. They are approved as distributed.

THE SECRETARY: Mr. President, I have the usual membership statement.

New Members

Name	Occupation	Address	Proposed by
Grant Hall, Sup. M. P., Can. Pac. Ry., Winnipeg, Man...			J. W. Taylor
Chas. B. Owens, Westn. Sales Agt. Youngstown Car Mfg. Co., Chicago, Ill.			J. E. Simons
A. C. Hinckley, M. M., C. H. & D. Ry., Lima, Ohio.			J. W. Taylor
B. P. Flory, S. M. P., N. Y. O. & W. Ry., Middletown, N. Y.			J. W. Taylor
Clarence A. Brooks, Mach. Insp. U. P. R. R., Hillburn, N. Y.			W. S. Strong
Herman Sewing, Gang Foreman, C. B. & Q. Ry., W. Burlington, Ia.			J. A. Carney
L. H. Wink, Car Foreman, C. & N. W. Ry., Chicago, Ill. . .			C. H. Osborne
L. T. Canfield, Assn. of Mfrs. of Chilled Car Wheels, Chicago, Ill.			J. W. Taylor
J. F. Enright, S. M., Int. & Great Northern Ry., Palestine, Tex.			J. W. Taylor
A. L. Kendall, W. P. Taylor Co., New York City.			J. W. Taylor
R. E. Smith, G. S. M. P., Atlantic Coast Line Ry., Wilmington, N. C.			J. W. Taylor
Arthur Hale, Chairman, Amer. Ry. Assn. Com. on Car Efficiency, Chicago, Ill.			J. W. Taylor
L. L. Austin, Gen'l Claim Agt. N. W. Elevated R. R., Chicago, Ill.			J. L. Berman
L. L. Dixon, Asst. Superv. Air Brakes L. S. & M. S. Ry., Elkhart, Ind.			A. M. Bickel
L. E. Cartmill, Gen'l Foreman Pac. Fruit Exp. Co., Los Angeles, Cali.			L. L. Yates
N. H. Mull, Spec. App. C. B. & Q. Ry., Aurora, Ill.			G. H. Hill
O. H. Rehmyer, R. F. E., C. R. I. & P. Ry., Blue Island, Ill.			M. A. Barnum
E. H. Russell, Mech. Dept. P. R. R., Chicago, Ill.			W. G. Wilcoxson
A. D. Cressler, Prest. Kerr Murray Mfg. Co., Ft. Wayne. .			W. S. Morris

Resigned

J. C. Thorpe
 Geo. Thompson

O. F. Zeng

A. J. Gillespie
 Robt. Bissett

Mail Returned

C. J. Hosmer

H. G. McDuffie

Membership, February, 1909	1,546
Resignations	5
Dropped-Mail returned	2
	1,539
New members approved by Board of Directors	19
Total membership	1,558

THE SECRETARY: Mr. President, I would like to say to the members that I have here complimentary tickets to the Maintenance of Way Exhibition which is being held in the Coliseum this week. If any of the members desire tickets so they can attend, if they will come forward after the meeting they can have them.

THE PRESIDENT: It affords me special pleasure to announce the speaker this evening, whose subject is of such vital interest and has not been discussed before. Allow me to introduce Mr. W. L. Park, General Superintendent, Union Pacific Railroad Co.

PUBLICITY FOR RAILROAD ACCIDENTS.

BY MR. W. L. PARK, GEN'L. SUP'T. UNION PACIFIC RAILROAD CO.,
OMAHA, NEB.

Gentlemen: To railroad men the question of accidents and their prevention is paramount. There is, naturally, no other one thing connected with railroads that carries with it the same amount of worry and mental distress to the officials and trainmen as the probability and actuality of accidents. The possibility is always imminent and can never be entirely eliminated.

Any practice which will reduce the number of avoidable accidents is eagerly sought for, and the placing of responsibility where it belongs in case they *do* occur, is only just to those who suffer thereby, either physically, financially or mentally.

Statistics of railroad accidents are accessible to all and quite well known. I desire to refer to them briefly to refresh the memory in connection with my topic, "Publicity for Railroad Accidents," and insofar only as they relate to casualties to persons. From the Interstate Commerce reports we learn that for the year ending June 30, 1906, the total number was 108,324, of which 10,618 were fatalities and 97,706 personal injuries. There were 359 passengers killed and 10,764 injured; 3,929 employes killed and 76,701 injured; outsiders, 6,330 killed and 10,241 injured. For the year ending June 30, 1907, there were 3,764 persons killed and 68,989 injured. While there is apparently a very marked diminution in the casualties, we, as railroad men, know that it is in proportion to the lessened volume of business and that accidents increase in greater ratio than an increase in business, for many reasons.

As railroad men we must admit that the long list of appalling

accidents, accompanied with fatalities and personal injuries to passengers and employes, many of which were avoidable, is a blot on our escutcheon which must be wiped out before we can return to the full confidence of the greatest of all earthly judges—"Public Sentiment."

How may this be accomplished, is, in our opinion, the one great problem today confronting operating officials and employes. The solution unquestionably lies in the direction of taking the public into your confidence, making them feel that they have as great responsibility in upholding the law of discipline on railroads as they have in upholding the law in the government of the ordinary affairs of life. Publicity for accidents, placing the same responsibility upon those who violate the rules of safety as is now placed upon those who in other ways do the public a harm, will certainly bring about a very different conception of duty.

Railroad men of sufficient longevity of service cannot fail to compare the *esprit de corps* of a few years ago with conditions existing on American railroads today. Instead of that intense interest and voluntary loyalty, we have a lethargic performance of duty, and a very pronounced indifference to the employer's interests, with almost studied effort to render such service only as may be contracted for, to the extent that on some railroads there is actually in vogue a system of fines assessed against trainmen who do more than their schedules provide, and those who are known as "company men" are unpopular among their fellows everywhere.

The loss of this voluntary loyalty is most severely felt in the discipline. The pecuniary losses, through indifference—inviting adverse public sentiment—are great and to be deplored, but the loss of reputation and confidence in railroad management is one that falls heavily on every official and employe connected with a railroad, making them vulnerable to the attacks of enemies, who are ever watchful of such opportunities.

While we do not contend that the employes' organizations sanction or even encourage indifference, force of circumstances undoubtedly carries the members under their protection into such a line of thought and action that the service is unconsciously tainted thereby. It is, perhaps, somewhat difficult to put the finger on the spot so contaminated, but it is there nevertheless, and is growing larger every day. It is to the interest of the employes, as well as the railroads, that it be eradicated.

Such influences of organizations are not by any means confined to the members; it affects other employes, and even the officials, who are expected to administer discipline impartially, influencing their decisions through fear of being reversed by superiors, who may be actuated by motives foreign to the case under consideration. I know of a very prominent shipper demanding the discharge of an employe under penalty of diversion of business, and, as the complaint was

just, such action was taken. When the pressure of organization was brought to bear on him he was as emphatically insistent on the re-instatement.

The responsibility is not, by any means, entirely with the rank and file. Employees in self defense have been forced into co-operation for mutual protection against petty persecutions and discriminations on the part of railroad officials. The organizations are expensive to maintain and, at times, exact from the members sacrifices not in accord with the spirit of independence bequeathed them in the Declaration of Independence. The yoke is galling, but must be worn until such time as officials are so surrounded with established methods of discipline as will do away with the injustice and vindictiveness in fixing penalties. Our present system is primitive and barbarous, it insults the intelligence of employees and forces them into alliances for self protection. Once having the power, they naturally exercise it in directions not originally intended.

While I may be telling a family secret, it is a fact that not a few railroad accidents are white-washed in the investigation to the extent that the officials even deceive themselves. The evidence is often made to substantiate a preconceived conclusion as to how the incident occurred. The dominant influence of one in authority frequently asserts itself to the extent that the interrogating or giving of testimony is shaped to meet the well known views of a superior. This influence may be unconsciously exerted or absorbed.

There never was a truer saying or greater reflection on railroad men than that "The science of railroading is the art of shifting responsibility." From track to the tender, from the engine to the coal, from the dispatcher to the conductor, from the trainmaster to the call boy, from one department to another, and so on *ad infinitum*.

The cure of disease is dependent upon an intelligent diagnosis of the trouble. So the prevention of accidents lies in a thorough, intelligent and unbiased investigation as to the cause—applying the remedy is not so difficult.

To get at the true cause of the deficiencies of which the public accuse the railroad men and apply the remedy must be the first step in obtaining a cessation of the meddlesome public interference in operating affairs with which we are now threatened.

I quote from the Twenty-first Annual Report of the Interstate Commerce Commission, 1907:

"The investigation of collisions, derailments, and other serious accidents on railroads by competent experts is a matter deserving the careful attention of Congress. A recommendation to authorize such investigation has been made in previous reports, and the same recommendation is now again made. Some of the States of the Union now conduct expert investigations of the more serious railroad accidents, but in many states there is no authoritative and expert investigation whatever, except as the facts of accidents may come before

the courts when suits are brought against the railroad companies for damages.

"All persons travelling on railroads and all men employed on engines or trains are interested in this matter. A railroad manager may have reasons—possibly in some cases, from his own standpoint, good ones—for concealing the facts of a wreck; but it is to the public interest that they be disclosed, as a warning to others and to throw light on means of prevention.

"The daily and technical press have both endorsed the recommendations which have been made by this commission. It is universally recognized that the causes of railroad accidents are often complicated and obscure and the responsibility difficult to define. A cross-examination and sifting of evidence is necessary, in nearly every case, to bring out the truth and to rightly apportion the blame. Investigation by officers appointed by the Board of Trade has been a powerful lever in the improvement of the management of the railroads of Great Britain, the reports of the investigating officers being published and widely read.

"Unlike some of the questions connected with the subject of rates or other matters, this subject of accident investigation (as well as that of block signaling) is one of which there is no doubt as to public policy. All persons are agreed that the lives of passengers on railroads should be better safeguarded and there is little, if any dispute, as to the direction which any government activity should take."

That the Commission has made little headway so far, is due to the fact that the American people, as a rule, are eminently fair and do not favor unnecessary interference with corporate or individual rights. We must remember, however, that there is a strong foreign element entwined in our body politic, which has for its long hereditary the supervising power of a sovereign. If our English cousins, through the Board of Trade can investigate accidents with unquestionable diminution as a result, and the German and other powers of Continental Europe through Ministers of Railway Affairs, can bring the heavy hand of the government to bear upon the transgressors of good practice, whether he be employe or official, to the end that few avoidable accidents occur, it is not looking far ahead to find our duties circumscribed by conditions much more perplexing than now exist.

It is not certain by any means that we shall stop with that which satisfies the conservative Englishman or phlegmatic German. It is said that we are more emotional than the French. We are not yet old enough to assume such responsibilities. Our schools and colleges do not turn out the graduate who has that astute perception of time and place as do the older seats of learning of the mother countries. We finish somewhat superficially with a predominance of American egotism, which is apt to give an idea of a monopoly of intelligence. In such hands it would be unsafe to place the control of railroads, not only to the railroads themselves, but to the very government.

Unless railroad men are willing to let the politicians take from their hands the reins and govern the railroads with inexperience and theory, they must analyze the present conditions and shape the future policy in this respect in accord with the growing sentiment that accidents are of too frequent occurrence and, unless prevented to a greater degree than now obtains. the strong arm of the government must intervene, be the consequences what they may. The influence now brought to bear to bring this about should be a warning.

Out of ninety United States Senators in the Second Session of the fifty-ninth Congress, sixty-eight were lawyers, and out of 386 Representatives, 253 were of this profession. During that Congress, 16,074 bills were submitted and 29,125 during the Sixtieth Session, indicating the tendency to govern this country by a trained profession—the “Political Lawyer”—who must cater to his constituents and do something conspicuous to secure re-election, the result of which is that we are submerged in a deluge of laws, most of which are inconsistent, impracticable and impossible of observance, to the extent that our entire jurisprudence is fast coming into contempt.

The control of this tendency is in the conservatism of business, as, with the commercial classes our interests are mutual. Manufacturing and transportation are, perhaps, the two greatest human vocations, unless it may be that of “production.” We should take into our councils those who more fully appreciate that railroading, as well as merchandising, cannot be managed or restricted by those who have little knowledge of its utmost requirements. If we are to be thus associated we must railroad on business principles. Throw open to the public that which they have a right to know. When they buy of us transportation for themselves or their loved ones, let it be with the assurance that if we are unable to deliver them safely, we will, as true business men, go to the bottom of our inadequacy and disclose the reason and correct it.

The public has less concern in the way in which we may handle its merchandise, for the reason that if we damage or destroy it, they have recourse to the full extent of their loss and its value. Reparation for loss of life or limb cannot be fully made in this way, and those who are caused to suffer are impatient of excuses. They justly ask that a full and complete investigation be made and that the responsibility be placed where it belongs in order that others may not suffer in like manner.

Courts of law and justice are established in every hamlet throughout the commonwealth for protection from those who either carelessly, or criminally disposed, do injury to their fellow men. Railroad operating officials, having in charge the investigation of accidents, as well as the administration of the railroad law and the fixing of penalties, stand much in the same relation to the public as the criminal judge, with the exception that his powers are vastly greater; his faults of commission and omission are less susceptible to criti-

cism and his procedure not so greatly restricted; he is the court and jury and executor—a responsibility greater than that reposed in the army and navy, unless in time of war. The verdicts of railroad officials are generally accepted as final and the proprieties outraged if any exception is taken.

While we have spread on our statute books laws punishing those who are criminally careless, their application to railroad men is almost *nil*, for the reason that the public appreciate that railroad men should be, and are (as their organization is) peculiarly gifted in unravelling the intricacies of the written and unwritten laws governing the management of railroads. This confidence in our integrity is worthy of a higher conception of duty. Unless railroad managers merit such confidence by an impartial and thorough investigation of such accidents as disturb the public welfare, such power will be taken from them. The general public are satisfied with justness—a fair and impartial official can retain the respect and confidence of the public and his employes even if severe; one who discriminates cannot, although seemingly popular.

There are officials who do not know, and not knowing fear detection. "Publicity for Accidents" will undoubtedly relegate them to civil life. There are others who are influenced by those higher in authority, who do not have the courage of their convictions. There are also a great many who arrogate to themselves a disregard of public opinion; and there are also those who have mental inertia. A competent railroad operating official ought not to fear "Publicity for Accidents." He should be so well grounded in his methods as to invite publicity. The public will help him to place the responsibility where it belongs, and secure for him the individual responsibility, which is essential to any well managed property.

As it now stands, the managers must bear wholly the odium of a disregard of the rules. If an accident occurs the men implicated will frequently accuse the officials of not enforcing the rule, a violation of which was responsible, alleging that custom superseded it.

Railroads pay for high class train operation; expensive training schools of instructions on the rules of operating are provided and the cost of transmitting practical experience to the conductor or engineer in the first year or two of responsibility is great. Thereafter they should be willing and required to assume the full measure of such responsibility.

I do not wish to be understood that justice should not be tempered with mercy, or length of service taken into consideration in fixing discipline—each individual should, however, bear his share of the responsibility. He should be required to deliver service paid for, and if he will do this conscientiously there will be less need for discipline.

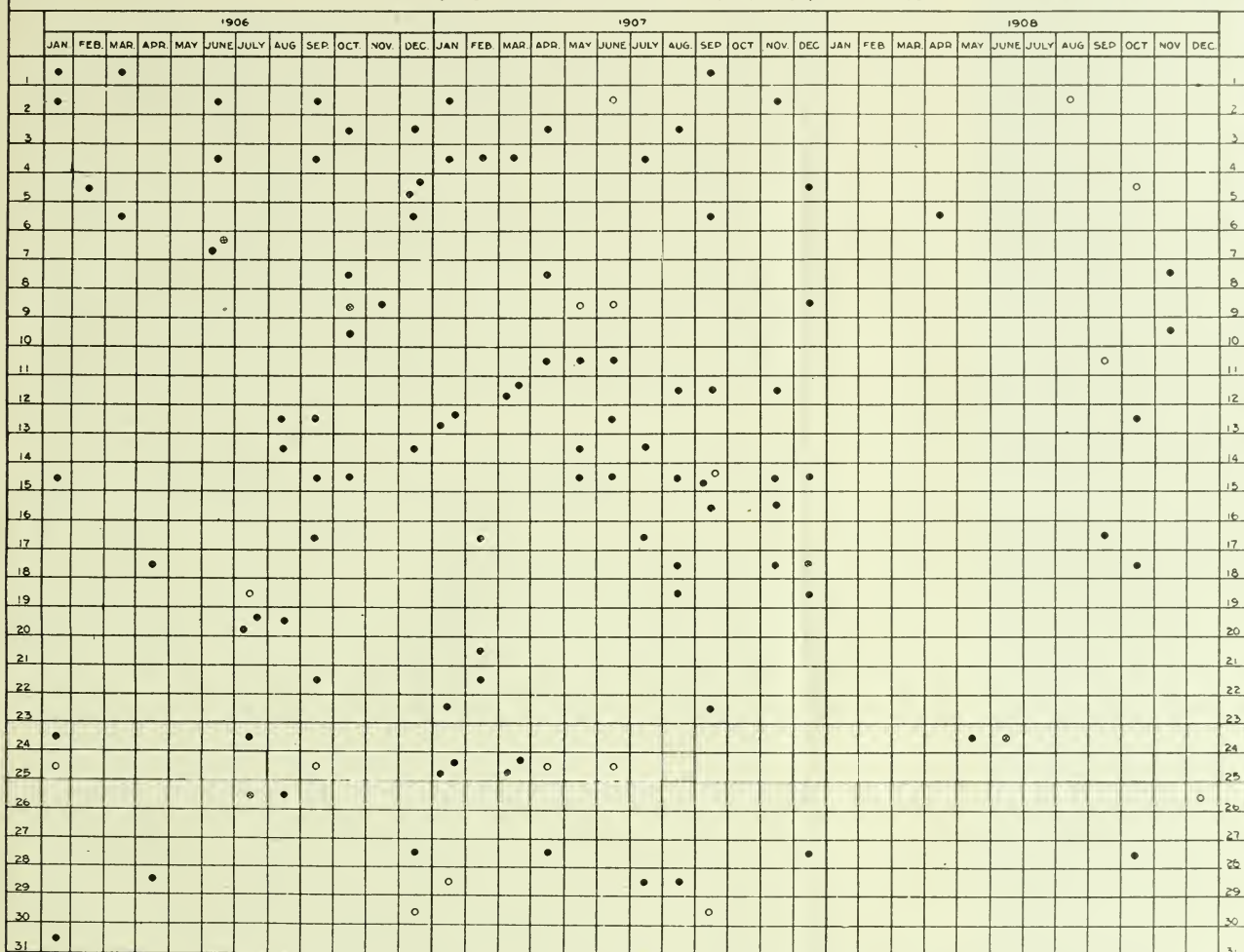
You, gentlemen, being practical railroad men, are naturally conservative and must be fully convinced of the necessity and value of

UNAVOIDABLE ACCIDENTS
ACCIDENTS DUE TO BROKEN RAILS
ACCIDENTS DUE TO NEGLIGENCE

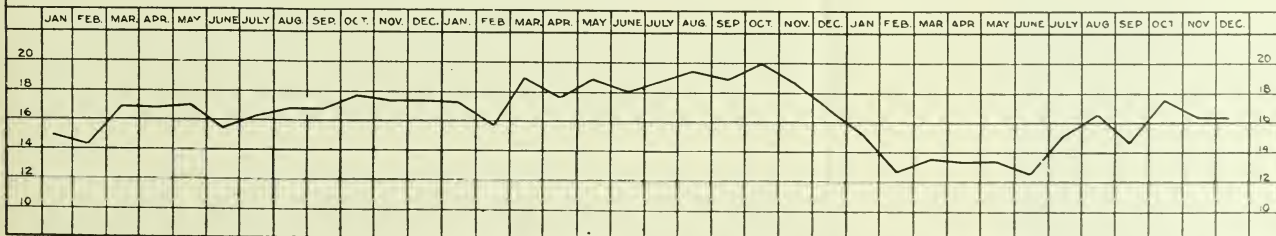
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DATES OF OCCURRENCES OF SERIOUS ACCIDENTS UNION PACIFIC RAILROAD - CALENDAR YEARS 1906, 1907 AND 1908

○ UNAVOIDABLE ACCIDENTS
● ACCIDENTS DUE TO BROKEN RAILS
● ACCIDENTS DUE TO NEGLIGENCE



LOCOMOTIVE MILEAGE - ONE EQUALS ONE HUNDRED THOUSAND



an innovation before giving it consideration. From my experience, I am aware that concrete illustrations are more convincing than theories or opinions. The Union Pacific is perhaps the first railroad adopting this method. We approached it with no little timidity, it is to be confessed. Our legal department said it would not do, as it would throw open to legal "shysters" information upon which claims would be made for damages and personal injuries. As a matter of fact nothing of this kind has occurred; *per contra*, the accident having been thrown open to full public investigation, there are no mysteries for the opposition to delve into; no vague insinuation that the great corporation is crushing the helpless client by suppressing the facts—which is always a stock in trade with the plaintiff in a damage case. That such investigation helps the legal department there is no doubt. The newspapers cannot sustain a reputation for veracity and misrepresent the facts—public opinion disposes of it without any mental reservation.

Not in the order of sequence, I desire to give you a few of the public investigations as an example of this and leave it to your judgment as to its effect in case of litigation—otherwise there is no question whatever as to betterment of service.

A board of inquiry convened December 3rd at Cheyenne, Wyoming, for the purpose of investigating a collision which occurred at Borie, Wyoming, on November 10th, in which an eastbound freight train, descending the east slope of Sherman Hill became uncontrollable, striking a work engine and way car, which had been employed on the Carr-Borie Cut Off, killing ten employes. Special tests were made of air appliances and their effect on trains. Experts in the operation and the use of air as well as a large number of employes were interrogated. The findings of the board were as follows:

"After an examination of all employes concerned in or having knowledge of the handling of Extra 223 East down the east side of Sherman Hill on night of November 10th, and from testimony given by a number of experienced engineers, firemen, conductors, brakemen and car inspectors employed on the Fifth District of Wyoming Division, Union Pacific Railroad, we find that this train left Laramie and passed Buford in normal condition in every respect, all of which supports the findings of the first board convened to investigate the cause of this accident, as hereinafter quoted, to wit:

"After having heard the testimony of Conductor McCormick, Brakeman Tracy, of Extra 223 East, Engineer Clinton and Fireman Hansen of Work Extra 1508, who were in collision at Borie at 7.40 P. M., November 10th, 1908, we have reached the following conclusion:

" 'As the evidence shows leaving Buford Extra 223 had a train line air pressure of ninety pounds; at a point between Ozone and Buford this pressure was reduced to forty pounds, the conductor having stated that frequent applications and releases of air had been

made without the necessary time being allowed for the train line to recharge, we believe that the accident was caused by the improper manipulation of air by Engineer Schley of engine 223, which resulted in his not having the necessary pressure to control the train when the emergency arose.' ”

“We further find and believe that had prompt and proper response been given by the crew with hand brakes, the speed of this train would have been checked and controlled in ample time to have prevented the accident.

(Signed.) Charles C. Hughes, Chairman, General Superintendent, C. & N. W. Railway, Retired; George M. Randall, Major General, U. S. A.; Frank D. Baldwin, Brigadier General, U. S. A.; W. B. Scott, Assistant Director Maintenance & Operation, Union Pacific System—Southern Pacific Company; H. H. Forney, General Air Brake Inspector, Southern Pacific Company; A. L. Mohler, Vice-President & General Manager, Union Pacific Railroad; W. L. Park, General Superintendent, Union Pacific Railroad.

This is the first investigation of this character in which United States army officers participated. The long army experience of these two military men, with absolute independence of action, gave them the requisite qualifications to conduct an unbiased investigation and render an opinion without fear or favor.

An accident killing two employes and injuring several others, due entirely to an Act of Providence, is fully established for the legal department, as follows:

“We find, after a careful investigation of the above referred to accident, that it was caused by an unprecedentedly heavy wind coming from the north overturning the caboose.

“And we further find that neither the Union Pacific Railroad Company nor its employes, are in any way responsible.”

(Signed.) John A. Martin, President, Wyoming Hardware Company; H. L. Anderson, Superintendent; Wm. Niland, Master Mechanic.

A car containing valuable government registered supplies such as stamped envelopes, was destroyed by fire while in one of our mail trains. The presumption on the part of the government is that such fires are external and the railroad responsible. The board of inquiry found as follows:

“The Board of Inquiry investigating cause of mail car U. P. 1133 found on fire in train No. 9 one mile west of Maxwell on May 20th, wish to submit the following report of our inspection of engine 31, on train No. 9 of this date:

“Ash pan damper netting pinned down, ash pan damper, netting and front end netting examined and found same in first class condition. Our investigation of cause of fire in mail car 1133 one mile west of Maxwell from the testimony of train and engine crew, we

find this car located in train first car behind engine and is used for storage mail. After car is loaded at Council Bluffs all doors are locked, no one having access to car, except Chief Mail Clerk in charge of working force. We find the fire was confined to interior of this car, cause of fire indeterminate, car had not been opened at any point en route between Council Bluffs and until it was opened by Chief Clerk one mile west of Maxwell, where the contents of car were found to be on fire."

(Signed.) L. W. Walker, Manager Electric Light & Power Company; W. T. Beery, District Foreman; W. R. Cahill, Assistant Superintendent; G. H. Likert, Master Mechanic; E. T. Tramp, Merchant, Ex-stack Inspector of Union Pacific Railroad; Wm. Cunningham, Superintendent North Platte Water Company.

It is alleged frequently in case of a locomotive boiler explosion that there was an inherent weakness. Board of inquiry composed of division officials and Ex-Governor John R. Osborne, Member of the 55th Congress, found as follows:

"That the explosion of engine 1647 was due to low water and overheated crown sheet. The responsibility rests entirely with the engine crew.

"Investigation showed that the crown sheet gave way through the eleventh row of stays from flue sheet, breaking entirely in two; through this row of holes from side seam to side seam, eighteen holes across top of box. The break from side seam angles backward, terminating at fourteenth row from mud ring, left side: The side seam, left side, sheared rivets from break across crown sheet forward to the tee iron, balance of seams pulled down with crown, dragging sides with them to the point before mentioned. Buttonhead bolts in the tee iron did not pull through part of crown back of these, to break in sheet, which occurred in eleventh row of stays laying against flues. That part of crown back of the break pulled loose, coming below mud ring twelve inches and is twenty-eight inches at this point ahead of door sheet. Crown was red hot nearly ten rows of stays in width at flue sheet and eight inches wide at fifth row of stays from door, making red hot section nearly four inches in width of flue sheet and eight inches wide eighteen inches from door sheet. About six radial stays and stay bolts stripped off fire box sheet, none of these bolts broken. Casing sheets, boiler head and mud ring badly bent outward, excepting at top where they are dented in by boiler striking at this point in its fall. The smoke stack was still on smoke box, which was on the boiler, while extension is torn off and lays under cylinders. The crew concerned in this accident arrived at Green River 12:20 P. M. and left at 12:50 A. M. having had 20 hours 30 minutes rest."

(Signed) John R. Osborne, Ex-Governor, Wyoming; H. L. Anderson, Superintendent; Wm. Niland, Master Mechanic; A. J. Wharf, Division Engineer.

THE PRESIDENT: Gentlemen, before opening the discussion to the

members here present we will ask the secretary to read several written discussions which he has received on this paper we have just heard.

THE SECRETARY: Mr. President, I have a communication from Mr. W. B. Throop, general superintendent of the Iowa Division of the Chicago, Burlington & Quincy R. R. Co.

Burlington, Iowa, March 12, 1909.

To the President and Members of the Western Railway Club:

A copy of a paper, entitled "Publicity for Railroad Accidents," by Mr. W. L. Park, General Superintendent, Union Pacific Railroad, has been sent out to the members. Following the usual custom, requesting criticisms of the same. I submit the following:

Mr. Park prefaces his paper by a comparative statement of the number of passengers and employes killed in train accidents for the years ending June 30th, 1906, and June 30th, 1907, the latter year showing a marked diminution in the number of people killed, and he attributes the cause of this to the fact of a lessened volume of business in the latter year. Without referring to any statistics of passengers carried or tonnage moved, I do not think that this assumption is borne out. The panic, which caused such a marked lessening of business in general, occurred in the latter part of October, 1907, and according to all statistics of railroad operation which I have observed, the year 1907, up to and including October, covered the largest business of any year of which records are in existence, so that there may be some ground for encouragement in the fact that the safety of people riding on trains was so materially increased in that year.

The gentleman next takes up the cause of accidents in general, suggesting the remedy in the direction of "taking the public into your confidence." He further comments on the lessening efficiency of train and enginemen in particular as years go by. Possibly the latter is true. I know of no gauge to go by except the general impression gained by those who are in immediate contact with railroad operations and their observations of men now and in previous years. Mr. Park, however, I think, suggests one strong reason for this deterioration in the character of service rendered, on Page 2 of his paper in the next to the last paragraph, and if railroads in general or any one in particular is afflicted with officials who have not sufficient scope of character to so treat their employes and to give them to understand that it will not be necessary for them to join any organization to escape persecutions and discriminations, then the remedy for some of our ills rests with the head officers of the railroad companies themselves. I have known men in charge of train and enginemen who were measurably afflicted with a lack of proper characteristics for the execution of their duties; men unable to control their subordinates and of doing it in such a way that the men not only could not rely on the fairness of such decisions as these men might make, but would not work loyally for them, but this class of men is few in number and they very soon exhibit their failings to that extent that they drop out.

As to the managing officials of railroads being so biased by any consideration that they deceive themselves as to the cause of an accident in any particular case, I am pleased to say that I have never known any such men, although I have known a large number of men in influential positions on railroads.

I cannot imagine that it is necessary, to convince the public that operating officials of railroads are telling the truth about the cause of any particular train accident, to take one or more of the public into the investigation which follows the accident, and it appears to me it would be a decided confession of weakness to be driven to such an extreme.

I have commented above on the qualifications of men who are fit for positions in which they are responsible for the operation of a line of railroad, as

to their characteristics in general, and if any or all of them are unable to tell the plain, unvarnished truth about whatever may happen, and do it without reservations of any kind, I cannot think that he is a fit man for the position, nor do I think that he will remain long in a position of responsibility. What objection there can be to giving the public, through the press or any other way, the exact causes of railroad accidents, whenever we may be asked for them, I cannot conceive! I have never hesitated to do so myself and I do not claim any superiority in the matter in any respect. I do not know of any one else with whom I have associated who has hesitated to take the same course. There is nothing I imagine that would weaken the cause of a railroad company so much as to undertake to cover up or give the wrong impression of the cause of an accident, and which cause would sooner or later be almost sure to become known.

The remedy, therefore, as I look at the matter, is to apply ourselves more diligently than ever to the establishment of better operating facilities—better track, better signals, better engines and cars, and from this it would naturally follow that we could enforce better discipline, as the better the facilities are the more attractive the service becomes, and the easier it becomes for men to comply with the necessary rules for safe operation. If the public needs education in anything in their bearing towards railroads it is to make them realize that railroad companies, in order to make their operation safe, need large amounts of money, and this can only come from increased earnings, and increased earnings surely cannot come from the constant pressure which is applied to railroads in various ways to reduce their revenues.

I think an open, frank statement of the conditions, such as I have attempted to above describe, would help railroads more than a move to take individuals into investigations of accidents could do. I would not, however, have any objection, in fact it might, I believe, lead to improved conditions, if there were a government board, such as suggested in Mr. Park's letter, which would investigate serious train accidents and apply remedies after the custom followed in England, Germany, and perhaps other countries.

THE SECRETARY: I also have a communication from Mr. W. D. Cantillon, Assistant General Manager, Chicago & Northwestern Ry. Co.

Chicago, Ill., March 16, 1909.

Mr. President and Gentlemen of the Western Railway Club:

I have read with a great deal of interest the very able paper presented by Mr. W. L. Park, General Superintendent of the Union Pacific Railroad with reference to "Publicity for Railroad Accidents," and in it there surely is much food for reflection, and although it is an entirely different method from that pursued at the present time in conducting investigations of accidents on railroads, I believe it is a step in the right direction.

There has been considerable criticism of railroads and railroad management in the past few years, and I believe the public will, at no distant date, insist upon an open investigation of serious railway accidents—at least, those which involve death or injury to human beings, and I believe that the management which fails to provide proper facilities for safe operation will be held criminally negligent, and the employee who does not perform his full duty, will in all probability be subjected to criminal prosecution. So I say, I am a firm believer in the widest publicity for the investigation of railway accidents and in connection therewith, the discipline applied in every case.

There is no doubt whatever but what general action along the lines suggested by Mr. Park would have a very beneficial influence in assuring the public that every effort was being made by the railway managers to ascertain the causes of accidents, and apply the remedy.

I have read with interest some articles written for a monthly magazine by an ex-railway employe, and if discipline is applied on railroads as indicated

by the writer of the articles, it would be beneficial, not only to the public, but to the railways, and the employes of the railways if public investigations were to be made of every accident, and also the discipline applied therefor. Why should there be any hesitancy about publicity for railway accidents? What manager has anything to conceal? Why should there be any concealment? Ninety per cent of the railway accidents are caused by negligent or incompetent employes. For instance, despite the fact that the engineer has deliberately run by two blocks which indicated "Stop," also ran at an excessively high rate of speed where his train should have been under control, passed a flagman at such a rate of speed that he could not stop, and his heedlessness, carelessness and incompetency were entirely responsible for the wreck; nothing could have stopped him but a derail.

Why should there be any secrecy about giving the public these facts, and why not have them investigated by the public?

Are we too secretive about railway accidents? Is the public suspicious of the meager reports of accidents? Why not give the public, immediately, through the press, full, complete and correct statements regarding accidents so far as we are able to do so, and not shroud everything in an atmosphere of mystery, which only serves to stimulate the newspapers into exaggeration and excites the public mind.

Mr. Park refers to the influence of railway organizations and cites a case where a prominent shipper demanded the discharge of an employe, and when pressure was brought to bear upon the same shipper by the employes he was emphatically insistent upon his reinstatement. We have altogether too much outside influence in the matter of discipline.

There is no more important subject in connection with the operation of a railway than discipline and it should receive the most careful and deliberate consideration from those applying it. The interests of the employe and the company are so great that the question of discipline should not be influenced by any organization or any business consideration.

The loyalty in the employe depends to a great extent upon the proper administration of discipline. If the employes have the idea that discipline is resorted to in a hap-hazard manner, particularly with the idea of punishment, they will never be loyal. Some men never will be loyal anyway; they are not loyal to anybody but themselves and this class of men have not sufficient intelligence to understand that loyalty is beneficial to themselves. I believe that the sense of loyalty can be readily increased if the employe can be made to understand that the interest of the company which employs him is his interest; then he will be more valuable to the company and the proper administration of discipline will further add to his fidelity to the company.

The management of a railway company has a serious responsibility, and I believe that discipline should be applied only after a most careful and searching investigation, and that no consideration should be given outside influences from any source. The best discipline we can administer is to gradually eliminate from the employes the thoughtless, the careless and the incompetent, thereby holding out the prizes to the thoughtful, the careful and the competent.

So I repeat that I consider "Publicity for Railroad Accidents" a step in the right direction. I also believe that the discipline for accidents should be posted on a bulletin board open to the inspection of the public, and that the requests of the various organizations for reinstatement of men responsible for accidents causing death or injury to human beings should also be posted

where the public might view them. In that way the public would be able to gain some idea of the requests which are made upon railway managers by the various organizations for the reinstatement of negligent, incompetent and careless employes.

THE SECRETARY: I also have a communication from Mr. W. G. Besler, Vice President & General Manager, Central Railroad of New Jersey.

New York, March 12, 1909.

Mr. President and Gentlemen:

I only wish to make a few criticisms upon the paper presented by Mr. Park. Generally, I agree with his sentiments and statements, but in some few particulars I differ and disagree with him.

I take exception to the following paragraph:

"Railroad men of sufficient longevity of service cannot fail to compare the esprit de corps of a few years ago with conditions existing on American railroads today. Instead of that intense interest and voluntary loyalty, we have a lethargetic performance of duty, and a very pronounced indifference to the employer's interests, with almost studied effort to render such service only as may be contracted for, to the extent that on some railroads there is actually in vogue a system of fines assessed against trainmen who do more than their schedules provide, and those who are known as 'company men' are unpopular among their fellows."

I do not believe, and I think it would be impossible to prove that the majority, or even a considerable percentage of railroad men are not faithful and loyal to the interests by which they are employed, and while we perhaps may know of some few instances where there is not that esprit de corps which there should be, and which there COULD be, I feel entirely certain of my ground when I say that those instances need not exist any longer than it will take to bring about certain changes which would thereupon change the entire atmosphere and aspect of the situation. I feel that a considerable mischievous influence has been brought about through the writings of Mr. James O. Fagan, with his "Confessions of a Signalman," and the following communication appearing in the New York Sun, I believe has just as much merit as the statements made by this man Fagan:

"To the Editor of the Sun—Sir: James O. Fagan quotes a railroad superintendent as saying of an engineer under his jurisdiction: 'We now watch the going out and coming in of that man with fear; but we are helpless.' It is absurd that anyone with ordinary intelligence can believe that such a state of affairs actually exists.

"While it is true that the railroad unions have representatives to look after the grievances of their members, at the same time if upon investigation any employee is found guilty of a charge as grave as the case of the above mentioned engineer he would be dismissed instantly from the service, and not only that but he would be unable to get a similar position on any other road, because his record would follow him all over the country.

"The travelling public can rest assured that the men in the train service are perfectly reliable; they not only know their business but they have the full confidence of the officials. Travelling by rail nowadays is as safe as any other mode of travel, with automatic block systems, signal towers and an elaborate telegraph system for the additional precaution of handling trains by the direction of the despatcher. Passengers are protected from the minute they board their train until they have reached their destination.

"Mr. Fagan certainly exaggerated conditions on the railroads, espe-

cially when he said that the unions practically run the roads. While the unions are always on the lookout for unfair discrimination toward their individual members, it is folly to say that the railroad officials are helpless to remove incompetent men because they happen to belong to a union.

"Being a member of a railroad union myself I feel that I am qualified to make these remarks: the railroad officials, not the railroad unions, are the real 'Masters of the Rail.'

"Charles Thomas.

"New Rochelle, March 8.

What we want is the **truth**, and however bad or damaging it may be, we must stand it and take the consequences. It is the perversion of truth about railway accidents that is the difficulty with our modern newspaper and magazine writers; and in this connection I wish to quote again the following article which appeared some years ago in one of the technical journals:

"It seems almost hopeless to expect that the public press and public officials will ever be content to speak without lying or misrepresentation or exaggeration when they deal with statistics of accidents connected directly or remotely with the operation of railways. The truth is bad enough; the number of deaths and injuries for which railway operators can justly be held responsible is appallingly large, even when the vastness of our railway mileage is taken into consideration; but the facts seldom satisfy those who seek to excite public sentiment on this subject. A brief telegraphed abstract of a statement from the Interstate Commerce Commission's office, dated October 7, is made opportunity for varied and singularly unjust perversions. One dispatch starts with the statement: 'An official bulletin prepared by the Interstate Commerce Commission shows that during the past year 9,984 people were killed in railroad wrecks.'

"But this version conceals the fact that of the 9,984 people reported killed, but a small proportion were 'killed in railroad wrecks,' 5,000 of them being 'killed while trespassing on railroad property,' and others, especially employees—the abstract does not give the number—meeting death from various other causes than train wrecks. In collisions—the form of accident which is inexcusable and for which chiefly the railways deserve condemnation—it appears that 123 passengers and 574 employees were killed during 1903, a total of 697 out of the 9,984 persons falsely reported to have been 'killed in railroad wrecks.' Yet one paper which prints these figures in the course of an extended article has the dishonesty to head the column, in large type, displayed in three headings, as follows: 'Railroad Wrecks—Ten Thousand Lives Were Crushed Out in Last Year's Accidents—Greed of Managers the Cause of the Awful Slaughter.'

"This is deliberate, sensational lying; for the number of lives lost in train wrecks was little more than one-fourteenth of 10,000, and the greed of managers can hardly be charged with the death of 5,000 trespassers, or of passengers and employees killed by their own lack of care, or by casualties resulting from broken rails, cloudbursts, tornadoes and other unpreventable occurrences. But honestly edited papers not infrequently confound all accidents on railways with 'railway wrecks.' Thus one usually fair Chicago daily heads a six-line dispatch from Washington: '9,984 Die in Year's Wrecks—Loss of Life in Railroad Accidents in 1903 Greater Than the Spanish War.'

"This also is incorrect in fact and unjust in its comparisons. So is comparison between British and American railways hinging on the familiar but false statement that on British railways 'not one passenger was killed last year.' This favorite assertion is perverted from the official statement, never equaled before or since, that in the year 1901

no passenger on British railways was killed 'by accidents to trains.' But in that year 135 persons were killed on British railways in various ways. In 1903 there were 148 passengers killed and 1,681 injured, the total number of persons killed being 1,159 and the total number injured 6,785 on 23,380 miles of railway—about one-fifth the railway mileage of the United States. Our own record of accidents—especially of preventable accidents—is appalling, and the burden of them on railway men is grievous; but this does not warrant falsehood and injustice in considering the record."

Finally, and as of interest in this connection, and dealing with the question of accidents to persons travelling upon the railroads of the country, it is interesting to note that as many passengers are injured annually in street car travel as are injured in steam railroad travel, and I give the following diagram, taken from a publication of the Travelers Insurance Company, showing for the year 1907, accidents resulting from causes to which all men are exposed, without regard to their employment:



The results secured by a Board of Inquiry, as shown in Mr. Park's paper, are in a manner interesting, but do not, to my mind, offer any great or startling improvement over present methods of investigation, provided that those who make the investigations, or who are in charge of railroad properties, are competent officers.

I am inclined more and more to the belief that the golf habit and the vacation habit as exemplified in some quarters, are equally responsible for a considerable amount of the alleged trouble so far as railroad employes are concerned; there was a time, and not so very long ago, when seven days a week, and every week in the year, with a constant and personal touch upon the affairs of the Company, was the measure of service.

There is no use to "cry over spilled milk," or to attempt to reform in a day conditions which have been brought about by a gradual change in the viewpoint of those who are now charged with the supervision of railroad properties. But don't blame the employe for all of the shortcomings and all of the lack of interest in Company matters. I have found in my experience that the character of the man in charge of a property is very apt to be prorogated through the ranks, and the adage that "you can't make a silken purse out of a sow's ear," still finds its application.

THE SECRETARY: I also have a short discussion from Mr. T. E. Calvert, Chief Engineer, C., B. & Q. Ry.:

T. E. CALVERT (C. E., C., B. & Q. Ry.). Mr. President: I notice one strange thing in the chart accompanying Mr. Park's paper showing date of serious accidents, that, in October, 1907, when we had the most business, we had no accidents at all, and while I can conceive of a somewhat greater chance of accident while the business is being built up, as it was from March to October, 1907, it seems strange that there should be so many accidents while the business was rapidly decreasing, during November and December.

Mr. Park has taken for public investigation *three sure* things. I am afraid if we would get some hardware merchant up against a fine proposition where it is pretty hard for an expert to tell what happened, his outside help would not be of much service.

THE PRESIDENT: Gentlemen, you have heard the paper and the very able discussions of it, which have taken some exception to points in the original paper. We would be glad now to hear the views of any others who desire to speak on the question. We have with us a gentleman who has made quite a study of railroad accidents during the past few years and has given some very excellent digests of the statistics on this subject. I think Mr. Slason Thompson could give us a few points in connection with this paper which would be very interesting. Mr. Thompson, will you let us hear from you?

MR. SLASON THOMPSON (Mgr. Bureau of Railway News and Statistics): Mr. President: It seems to me hardly correct to say that I have made an investigation of railway accidents. During the past five years I have made some study of the statistics of accidents, which is a very different proposition. Properly considered, the statistics merely point to where investigations might most profitably be undertaken; and it rests with those who make these investigations to suggest the means for their prevention, as far as that is possible.

In regard to the paper we have heard read tonight, I would say that I was most interested in that part of it which refers to the investigations made by the committee appointed by the Union Pacific, and in the fact that two army officers participated in the examination and in the report. This I consider to be along the line which must eventually be taken in the United States, if we are to have anything like a fair, unprejudiced and thorough investigation of railway accidents as is the practice in England. There, as I remember, the investigation is under the direction of a chief inspector, who is a colonel of the Royal Engineers, and three deputy inspectors who have the rank of major of the Royal Engineers, and several assistant inspectors. The pay of these men runs from \$7,000 for the chief inspector down to \$1,500 for the sub-inspectors. There is no reason on earth why in the United States we should not have a major general, provided he is a graduate of the engineering school, as the head inspector and say ten majors, who in

times of peace are not earning their pay otherwise, assigned to each one of the Interstate Commerce Commission groups for the investigation of all railway collisions and derailments and other train accidents of importance. These should be supplemented with a sufficient corps of sub-inspectors to inquire into the minor fatalities connected with the railway industry in which trains are not involved.

I did not come here tonight specially prepared to discuss the subject before the Club, because I have been very busy completing my Annual Report for the year ending June 30, 1908, which has just gone to the printers. In that, however, there are some figures which I think you might be interested in. In regard to the criticism that has been made of the figures presented by Mr. Parke as showing the effect of the business depression, the returns to the Bureau fully sustain his view. Unless I am mistaken, however, his dates should read 1907 and 1908 instead of 1906 and 1907. The great decrease in accidents came with the business depression following the panic of October, 1907. That panic designed and fostered, involuntarily no doubt, by legislatures and railway commissions, proved the greatest safety device ever applied to the railways of the United States. In the history of railway accidents in this country nothing can compare with it as a means of decreasing the list of killed and injured in the transportation business. Whoever was responsible for the panic of 1907 saved more than a regiment of lives in the United States last year. Idle freight cars kill no train men. Of these at one time there were over 400,000; and no patent safety appliance or block signal system yet invented afforded the great barrier to railway casualties that these idle cars did.

The members of this Club know that I believe most thoroughly that the personal equation is the only place where we can hope to make much progress in the prevention of railway accidents in the United States. You gentlemen know that between the year 1907 and 1908 there was no particular difference in the character of the safety devices and regulations of service on American railways; and yet these two years furnish the most remarkable contrast in the matter of railway casualties. In 1907, in spite of the fact that we had more miles of track under the block signal system, and in spite of the fact that the inspectors of the Interstate Commerce Commission reported the equipment in better shape than ever before in its history, the public was shocked, if not horrified, by the statement that 11,839 persons had been killed and 111,016 persons had been injured in railway accidents. In general discussions it was not disclosed that nine-tenths of these casualties were altogether unconnected with the movement of trains.

Against this harrowing record, but with business relieved from the strain and hustle of 1907, the record of 1908 presented a welcome contrast. Where the total of passengers killed in the former year was 647, in 1908 it was only 406; and where 4,353 employes were reported killed in 1907, there were only 3,358 in 1908; a decrease of nearly 1,000.

If the comparison is confined to fatalities in train accidents, there were only 165 passengers killed in 1908 against 410 in 1907. And only 642 employes were killed in the former year against 1,011 in the latter. In the quarter ending June 30, last, the report shows the greatest immunity from fatalities to passengers in train accidents of which we have record. The number killed was only 13 and of these nine have no right to be included in the reports, for they were killed in a collision of electric cars and were not due to accidents to steam cars at all. The records which I have here show that the depression of 1908 had very little effect in protecting "other persons," consisting chiefly of trespassers and suicides, from deaths in railway accidents. This is easily accounted for. Instead of preventing trespassers, business depression would seem to increase the disposition of individuals to use railway roadbed as a common footpath, if not as a lodging place. The road to loiter on by day and the bed to sleep on by night.

A review of the statistics of accidents furnished by the Interstate Commerce Commission shows that the country is going through precisely the same experience that it did in 1895 and 1896 after the business depression of 1893. In 1893 there were 299 passengers killed in railway accidents and in 1894, 324. You understand that the statistics for the latter years include the busy six months of World's Fair traffic in 1893. In 1895, when there was the greatest depression in railway service, the number of killed fell to 170, to be followed by only 181 in 1896. From that date to 1907 the record has steadily increased with the prosperity of the country and the increased demands for hurry in the handling of transportation.

An analysis of the statistics for 1908 shows that the large decrease in fatalities to passengers was in no sense due to a decrease in passenger traffic. This, on the contrary, showed the usual percentage of increase. The greater safety in the operation of railways in the United States in the year 1908, as I see it, was entirely due to the depression as it affected the volume of freight traffic. This decreased from 10% or 12%, and as nearly 70% of the accidents to passengers in the United States is due, directly or indirectly, to the freight traffic, the great falling off of that traffic resulted in a gratifying increase in the safety of passenger traffic. An examination of the principal accidents reported to the Interstate Commerce Commission shows that there were 13 collisions between passenger trains, 27 collisions between passenger and freight trains, and 40 between freight trains. It will be observed that freight trains participated in no less than 83% of the accidents and, it may be added, were responsible for 77% of the fatalities.

A study of these reports shows that railway accidents in the United States are due to practically the same causes as have been found to account for those investigated in Great Britain. Of the 29 major accidents investigated over there in 1907, 22 were due to want of care on the part of some individuals. And in regard to minor accidents, the same is true, that 24 out of 25 accidents were due to the

negligence, want of care, and misadventure of the sufferers. In Great Britain, where automatic couplers are the exception, there were only 18 accidents in coupling or uncoupling as compared with 239 in the United States where automatic couplers are almost universal. In connection with the 891 inquiries held by officers of the British Board of Trade in 1907, recommendations were made in 403 cases, with the following results: in 345 cases the recommendations were adopted. In 38 they were not adopted. In 20 cases they are still under consideration.

I have here a table which negatives the general impression that overwork is chargeable with a great many railway accidents. Out of 3,151 accidents investigated by the British inspectors during the last four years, a majority, 55%, happened during the first half of the twelve hours for which a majority of British railway employes are booked; and less than 3%, mark this, only 3%, happened when men were working overtime. In none of these cases was the accident attributed to long hours.

In regard to the disastrous Shrewsbury derailment, in which eleven passengers were killed, its immediate cause was found to be excessive speed maintained in the face of danger signals. But how a sober, experienced and physically sound "driver" approached Shrewsbury at such speed unless he "had a sudden attack of illness or a fit of some sort" has never been cleared up. Col. H. A. Yorke, who conducted the investigation, was of opinion that the driver was dozing as he passed two signal boxes and only awoke to his danger when too late. The driver had 13 hours for rest before going on duty and had been with his train only 5½ hours at the time of the accident. In his report Colonel Yorke says, "In America accidents have frequently been found to be due to the engineman or men being asleep, but in England this has rarely, if ever, been recognized as the cause, or as a potential cause, of an accident."

It is doubtful if American enginemen will admit that railway accidents in this country are "frequently found" to be due to their sleeping on duty. If Colonel Yorke had used the words "sometimes claimed," he would have more nearly expressed the situation. Somnolence is more often suggested as an excuse than found as a potential cause of any accident traceable to the cab of an American locomotive.

There is another point I would like to make in regard to the value of investigations by official examiners. This relates to its publicity side. Such examinations as those made by men selected only by the railway company, as is the case on the Union Pacific, are not accepted as conclusive by the public, even if their report receives the publicity its nature justifies. The general public, unfortunately, is suspicious of investigations made by or under railway authorities. But if the investigation were made by appointees of the government assisted, it might be well, by one representative of the railway company involved, and one of the railway union whose act was under investigation, the

result would be a report which would be accepted not only by the public but by the associates of all concerned. It would be regarded by them as the verdict of an impartial jury is regarded.

Now I think that we dwell altogether too much upon the danger side of railway operation. In the reports to our Bureau, I am pleased to say, I find data that is not only reassuring but almost beyond belief in its record of immunity from fatalities to passengers in railway train accidents in the United States.

From the reports of 316 companies, operating 124,050 miles of line carrying 455,365,447 passengers an average distance of 32 miles, and also carrying 916,123,410 tons of freight an average distance of 132 miles, NOT ONE PASSENGER WAS KILLED IN A TRAIN ACCIDENT DURING THE YEAR ENDING JUNE 30, 1908.

This, considering the myriad units of risk involved, is a record for immunity from fatal accidents without parallel in the history of railway operation, not only on the continent, but throughout the world.

The miles of line represented is greater than that of the United Kingdom, Germany, France, Austria, Hungary and Italy combined—in every mile, every rail, every tie and every spike of which lurked the possibility of a fatal accident.

The passenger mileage exceeds by several billions the enormous passenger mileage of the United Kingdom.

The freight ton mileage exceeds that of all Europe, with that of Japan, Argentina and Australia thrown in.

And yet this vast system, covering more than half the United States and operated under every condition of snow, blizzard, frost, flood and tornado, in the year 1908, had not one passenger killed in a train accident.

Combining the returns for the past four years it appears that during that time more than half the mileage of the United States is operated every year without a single fatality to a passenger. It is not always the same mileage—far from it—nor the best protected, because with protection is associated density of traffic—but it is an ever present and reassuring credit to the railways of the United States.

There are many more details in this report which I would like to present to you, but I have already occupied your attention too long. If anyone cares for these details, I would be pleased to send a copy of the report, when it is issued, to his address, if he will send it to the Bureau.

I thank you, gentlemen, for your attention.

THE PRESIDENT: I believe we have with us this evening another gentleman from the Union Pacific Ry. We would be glad to hear from Mr. Foley.

MR. T. J. FOLEY (Supt. Ter. U. P. Ry.): Mr. President and Gentlemen: My experience on the Union Pacific Ry. for the past year has been that publicity has been given to accidents without cover-

ing up anything at all. Everything in connection with accidents has been freely given to the public. I am very much in favor of it because I believe it is better for the Railroad Company to show outsiders that there is nothing to conceal and it is always better for the discipline of the employes when the public is represented at the investigations and that they do take part in the actual investigation. Mr. Park's paper is entirely in line with my views on this subject.

THE PRESIDENT: There is another gentleman in the audience who has made quite a study of the question of the matter of train rules. I think possibly Mr. Mackie of the Rock Island Road could give us some points of interest on this question.

MR. J. F. MACKIE (Secy. Train Dispatchers' Assn.): I have been so long out of active service as an operating man that I can say nothing in regard to present conditions, and so I will not inflict any theories on the Club, but it seems to me that the idea of publicity which Mr. Park has set before us tonight is just what railways have long needed, because the public has really been suspicious of the impartiality of railway investigation of railway accidents and the press has very largely aided in giving the public that impression. It seems to me, that by securing, as the Union Pacific is doing, (and I understand all the Harriman Lines are working along that line), that publicity in the vicinity of the accident, where public opinion can be brought to bear upon the employes responsible for the accident, a very great improvement in discipline may be anticipated, for public opinion in that respect, as in every other respect, is a potent factor in bringing about improvement on the part of employes in order to maintain their proper standing in the community in which they live, and that seems to me one of the most important features of the plan that has been adopted by the Harriman Lines, that it reacts on the employe in such a way that he or his fellows are thereafter likely to be much more careful, much more interested in carrying out the rules, in securing safety to persons and property than would otherwise be the case, if they had only the opinion of their fellows to bear upon them and the discipline of the higher officers to be imposed upon them in the way of penalties. So I hail the plan that has been adopted by the Harriman Lines as giving promise of a very considerable improvement, if generally adopted by the railways throughout the country. Of course we all look forward to a time when we shall have something like the investigations conducted by the British Board of Trade. There has long been crying need of it. I think Mr. Thompson's suggestion in regard to what the Interstate Commerce Commission might do or as to what the President of the United States, as Commander in Chief of the Army, might do in assigning army officers to such duties as suggested by Mr. Thompson is an admirable one, and I believe that it would be worth while for the members of this Club to bring their personal influence to bear upon their Senators and representatives in Congress, in order to bring about such action on the part of the

President and such legislation on the part of Congress as may authorize it.

MR. R. C. RICHARD (C. & N. W. Ry.): Mr. President and Gentlemen: The paper which has been read by Mr. Park is a very interesting one to everybody here and especially to those of us who have been engaged for many years in the investigation of railroad accidents. There are two points in that paper which if he would give us a little more light on would, I think, be a great benefit to this Club. The first point is that he speaks of a training school for operatives of the railroad. I would be glad if he would enlighten this Club as to how that training school is run, how long a course the men take and who the instructors are. Then the other matter of the publicity of these accidents. I suppose there are two ends to be attained by it: the first one being to ascertain by an impartial board the cause of the accident and the second to disseminate that information in some practical way among the employes of the road, in order to prevent a similar accident occurring in the future. I should imagine that the second point is as important, if not more so than the first one. Therefore I think we should be enlightened as to how that information is disseminated among the employes, in order that we may get the benefit of it.

In the first two letters that were read here this evening by Mr. Taylor the subject discussed seemed to be the prevention of accidents and not the publicity of accidents. The writers seem to have switched off entirely from the topic under discussion, and there has been very little discussion on the question as to whether or not it is politic as well as profitable to the companies to have this publicity of accidents. Personally I am heartily in favor of the method proposed by Mr. Park, but I think that that method ought to be followed out to the end, so there would be some benefit other than that of advising the public of the parts in those cases that would be benefited from that investigation.

THE PRESIDENT: We will ask Mr. Park to make a note of the questions and answer them in his closing remarks. I would also ask Mr. Park in closing to give us an analysis of the chart which accompanies the printed paper, and to which no reference has been made thus far.

MR. L. F. WILSON (The Railway Review): Mr. President and Gentlemen: I want to ask Mr. Park what his opinion is as to why the shyster lawyers of the country, who might have become interested in certain plaintiffs who brought suit against the company, did not pick up some of the findings of those investigating committees and use them against the railroads; that is, in the case of the train that got away and ran down the hill and it was found that the brake pipe pressure or the engine storage pressure was reduced from ninety to forty pounds. Couldn't the lawyers of the country have picked that up and made the point that the air brake apparatus was deficient? Couldn't they have gone to the Southern Pacific reports of the Westing-

house tests which were conducted in the Southern District north of Los Angeles last summer, and found that such could not have been the case if the train had been equipped with certain modern apparatus, such as "K" triple valves, or some of the other later improvements? It seems to me that it would be a pretty strong point for them to grab hold of and a point which they would not have been apt to dis-cover if it had not been for the report of the board of inquiry.

THE PRESIDENT: Mr. Morris, you must have held a good many investigations. Will you give us your views on this subject?

MR. W. S. MORRIS: It has been some little time since I have been on the firing line, but, nevertheless, the paper brings back the old spirit of railroad practice and railroad investigation. It has appealed to me very strongly, Mr. Chairman, that this paper is an innovation in the way of discipline for the betterment of train service, the betterment, in fact, of all service connected with railroads. We are all perhaps familiar with the old fashioned discipline that we used to dispense when we kept a fellow out of his wages for about thirty days and he had a good time while his wife and family suffered on account of the loss of earnings that was entertained by the employe disciplined.

Now this publicity of accidents, it seems to me, is entirely in keeping with the ideas expressed by the greatest men of our country, for the correction of evils not only for railroads, but for anything else where reform is necessary, and it seems to be a more humane manner in which you can get to the delinquent than by taking him into the office and, as the paper states, being judge, jury and executor. There is absolutely no way to criticize the jury that acts upon an investigation as recommended in the paper and gives publicity to their findings. It seems to me that it is a new theme entirely, and is bound to be productive of a great deal of good, because it reaches the fellow employe who will be guarded against a similar evil and I know from my own experience that I had a tender spot for my shop-mate, and would work pretty hard to cover up some of his faults, when he possibly bent a bolt to put it in a frame to make it appear to fit well, without taking it back to put in another.

As far as the organizations are concerned, I do not think there are any railroad men who object to an organization wherein they are governed properly, but some years ago an impetus was given to the organization of men by foolish decisions of officers. The old-time loyalty as expressed by the reader of the paper, I am sure, did exist, and with the later combinations among the workmen, no matter what they are, it is generally understood, it is an organization for protection. They don't come out in plain words, and as the paper says, you can't put your finger on it, but the sentimental protection is there just the same. This publicity will be very much like some years ago when an engineer burnt an engine,—he was condemned always by his fellow engineers for doing it. Now, when an engine is burned the remedy

is another trial. A man may prove perfectly efficient after this trial, but some years ago it was a dischargeable offense, and even now in the second instance, frequently through sentiment, an organization of workmen will feel that they can get a man back, if all there is to do is to organize and send a committee to the ranking officer, requesting his reinstatement. Now, if these accidents are reported, bulletined, and published, just as they are, I think it will have a lasting influence toward the good and the better discipline of all of our railroad employes, who are charged with quite as much responsibility, but are under less strict discipline than our army.

MR. W. E. SYMONS: Mr. President, and Gentlemen, I have listened with a great deal of interest to this very interesting paper, and discussions on the subject matter. I do not know that I can offer anything of real value, but there are one or two points brought up, on which I want to ask a question. I think the author has outlined a very good method of introducing this new feature of the railways taking the public into their confidence, but it raises in my mind,—that is, the personnel of the committee has raised in my mind a question that prompts me to intrude the suggestion that possibly later on in the operation of this and similar plans the personnel of the committees of investigation may undergo somewhat of a change.

The term "Public" as it is ordinarily used, or spoken, is an ambiguous one, and would warrant asking the question: Who and what is the public, and of what is it composed?

In America we have about eighty-nine million people, and of these eighty-nine million people there are about fifty or sixty million who are following agricultural pursuits. They furnish the brains, brawn, muscle and money of this country; they produce the majority of the best statesmen, financiers, educators and soldiers; they are the people who take care of the country in times of both peace and war, except that in time of war the soldiers they furnish and pay, do the fighting. While the army officers who served on the committee of investigation referred to, are in every sense the highest order of gentlemen, and able to discern more accurately (in matters in which they are versed) than outsiders, yet, as we are all the product of our environment, the question will naturally arise, and probably has arisen in the minds of some, as to their ability to judge in practical railroad matters with which they are unfamiliar, or to serve as a medium between the railroad company and the public.

The reasons assigned by one of the previous speakers, (who is better qualified than myself to analyze such matter), was that possibly their selection was due to the fact that they were sitting around doing nothing else, and on this account they were chosen. However, if this practice should obtain to any great extent, many of the people will, in my opinion, question the advisability of having the military arm of our Government taking hold of or controlling to any appreciable

extent the practical operation of railways, or investigating accidents occurring thereon.

It is quite true that this is successfully done in England, but England is under a monarchical form of government and from the time of the settlement of that little dispute down at Yorktown between Washington and Cornwallis, we have been working on different lines.

This is not a government by injunction, as has been unjustly charged by some, neither by the bayonet, but a government by jury, and the juries are composed of the people, and the people are the farmers. The term "farmer" is used sometimes in ridicule or jest, and sometimes in contempt by those who are many times his inferior; in fact we have heard the farmer referred to as a jay and a Rube, but he is the backbone of this country, and there is no place where a railroad operates or where it has any business transactions, but what farmers and the people that comprise "*The Public*" who compose the majority of the juries are accessible, and it seems to me that in taking the people into the confidence of the corporations it would not be a bad idea to have in view recognition of a great mass of representative citizenship other than the military.

ANALYSIS.

We have in the U. S. Army 4,777 officers. And a total enlistment, officers and men of 77,747.

These men are trained for war and not in industrial pursuits, neither do they form any part of or connection with the industrial or social fabric of a nation.

Against this we have as a part of a most distinguished citizenship the following:

Ministers	111,000
Physicians	140,000
Lawyers	114,000
Educators	446,000

Or a Total of.....811,000

which does not include sheriffs, county commissioners and many other county, township or state officers, who are better qualified as a rule to investigate matters of this kind than army officers, and who are not only important factors in their communities, but form a direct connection with the public.

One of the greatest philosophers known in the Christian world was once asked to rewrite his country's laws and said: "Allow me to write a nation's songs, and I care not who writes her laws." Now this principle finds application here, because this is a country of education, and if you are going to take the people into your confidence, why not work through some of the more resourceful channels, the pulpit, the physicians, the educator, the civil officer and the farmer? Why not

take into your confidence the people who pay the taxes to support the army, the people who furnish the sinews of war and the sinews of government, and the people who are better able to impartially decide as to a matter of right and wrong, in the practical work of a railway employe than an army officer, who clothed with military authority, and whose experience in matters of discipline is to give a command that will be enforced if necessary at the point of a bayonet, is trained in a direction foreign to the customs of the American people in all other matters, except war. And as there are in addition to the 811,000 representative citizens over 10,000,000 voters engaged in agricultural pursuits in America, it would appear they might form an important link between corporations and the public.

One of the speakers referred to the question of the cause of an accident cited in the author's paper. Doubtless, the author will answer it in his closure. I would also like to ask a question in reference to a matter of a somewhat different character in connection with the same accident.

In looking over the conclusion in this case, I find the following: "That the air pressure was reduced from ninety pounds to forty pounds without the necessary time being allowed for the train line to recharge, we believe that the *accident was caused* by the improper manipulation of air by Engineer Schley of engine No. 223, which resulted in his not having the necessary pressure to control the train when the emergency arose."

It was afterwards found that "had prompt and proper response been given by the crew with hand brakes, the speed of this train would have been checked and controlled in ample time to have prevented the accident." It, therefore, occurs to me, (and I will ask, if the author will kindly advise in his closure), that possibly this engineer and fireman were killed, they being dead could not, of course, give any evidence pertaining to the speed of this train, or as to the manner in which this air was lost or why the train crew did not *perform their duty* and thus *prevent* the accident. The crew, not having applied the hand brakes and thus controlled the train as they should, it might be assumed the cause of the train attaining so high a rate of speed should be charged to the improper manipulation of air, but that the *real cause* of the accident was *due* to the *failure* of the *train crew* to perform their duties by taking hold where the engineer either left off or failed, in which event there would have been no accident.

In the matter of inquiries by the Interstate Commerce Commission and responsibility of the Government, it occurs to me that in exercising similar jurisdiction over railways that the Government now does over steamships, the same degree of safety can be accorded to every employe and passenger on railways that there is on steamships, but that the personnel of the investigating committees, or the officers assigned to the work would probably give better general satisfaction to the public, as I understand the correct interpretation of the term public, if

selected from some other walk of life or vocation than from the military arm of our government, which I think if once established would gradually lead towards what might be termed despotism, which is not exactly acceptable to Americans and not in complete harmony with American principles. (Applause.)

THE PRESIDENT: Mr. Symons, I think possibly you have overlooked the fact, as shown by the reports in the paper, that quite a number of different vocations were called upon in drawing members of the investigating committees. Several merchants and other lines of business were included but I do not recall any farmers.

Your suggestion as to having ministers on the jury recalls an incident which occurred when I was handling engineers and firemen. One of our firemen who had a regular run was found carrying home a sack of coal from the railway company's coal pile with which to cook his breakfast and was caught in the act by the watchman. He had no good excuse for it, as he had his pay check in his pocket. The day after I had discharged him the rector of the church which I attended came to see me and interceded in the most urgent way for this man's reinstatement, told me in almost so many words that I didn't know my business, and finally when I reviewed the case and asked on what grounds he wished his reinstatement, "Why," he said, "he belongs to our church; it will hurt his standing in the church!" (Laughter.)

MR. SYMONS: I think the point by our President is quite well taken, and I accept his suggestion, or criticism. I notice, however, that the chairman of this board was Mr. Charles C. Hughes, ex-general superintendent of the Chicago & Northwestern Railway, who is a gentleman eminently well qualified to preside over a board of this kind and rule on its discussions and decisions, but the fact remains that Mr. Charles C. Hughes was not part of "*The Public*" in Wyoming and that is one of the points I want to bring out; that at points where these accidents occur and where the investigations are conducted there is ample material to draw from; abundant sources of material to draw from right on the ground, to compose these boards of investigation that will satisfy the people or public better, than by bringing in outsiders.

Now the railway people have complained bitterly and, in many cases, with just cause, that juries deal unfairly with them. The farmers who are not infrequently referred to as Rubes and jays, and are not taken into confidence by the railway and other corporations, but are sometimes treated with very slight courtesy by them; they get on a jury (juries are mostly farmers) and sometimes render verdicts adverse to railway companies' interests, whereas, if they had been taken into confidence by the corporations they would have doubtless, in many cases, rendered verdicts entirely different, and it is this particular feature which I wish to have brought out, not that I wish to criticise the honesty, integrity or ability of any of the *high grade gentlemen* members of that committee.

With reference to the minister. Cases such as cited by our President are not infrequent. I had a similar experience, only much worse which I will not relate, but will tell a story that is applicable alike to the medical profession and the ministry. I will tell this for fear that someone else might spring another joke on me for having mentioned the physician as a desirable member of committee. It is something like this:

At a banquet largely attended by professional men the question of their relative service to the human family was much discussed, and a prominent physician scored a strong point in favor of his profession which he supported by Biblical *authority*. In response, lack of knowledge of Biblical lore was pleaded, but to show that physicians were not always endorsed in holy writ three verses from the Bible were quoted as follows:

Verse 1. And Asa was taken very suddenly and seriously ill.

Verse 2. And Asa sent for a doctor.

Verse 3. And Asa slept with his fathers. (Laughter.)

Of course the moral to this might be construed to mean that it is not always a good safe proposition to call a doctor or take one in to your confidence unless you are prepared to *sleep with your fathers*, but notwithstanding the experience of our President with a minister, and the sudden demise of Asa following the engagement of a physician, these two professions are, in my opinion, excellent ones through which to mold public opinion.

THE PRESIDENT: I understand that we have with us Mr. Lee, General Superintendent of the Boston & Maine Railroad. We would be very glad to hear his views on this subject.

MR. C. E. LEE (G. S. Boston & Maine R. R.): Mr. Chairman: Owing to the hospitality that Chicago always extends to an eastern man, I was unable to hear the paper of the evening, but in justice to those men whose loyalty and absolute fidelity have made what little success I have attained as a railroad man possible I would like to say just a few words.

We have laws, good and perhaps necessary ones, but they are inoperative unless backed by public opinion, and I presume that even in the State of Indiana, through which I passed today, it would not be impossible for the highly moral members of this organization to get a drink if they wanted it. I have sometimes wondered if a railroad should erect a high pole one or two hundred feet in height and say to every engineer on the road, "If you pass that pole you will be discharged" whether in ten years it would have engineers enough to run the road. The same problem has to be met in the enforcement of the rules on our railroads that is met in the enforcement of our laws. No law can be rigidly enforced unless the public sees the necessity for it, and it is my opinion that no rule can be

rigidly enforced unless the men on our railroads see the necessity of the rule.

I know this is somewhat sacrilegious, but with an experience of some thirty years with railroad men I have come to this conclusion: When you hire a plumber to put in a bath tub in your house, you don't tell him to take so many feet of lead pipe and so many feet of other pipe and a two-inch auger and a chisel and many other things. You simply tell him you want him to put in a bath tub. The railroads, on the other hand, have tried to cover every possible contingency by a rule. They don't recognize their men as craftsmen. In my opinion if we would come down to the same rule that we apply to the plumber and recognize our men as craftsmen, tell them the conditions which confront them and let them exercise their own judgment, we would have very much less trouble.

A great many years ago probably some of the gray-haired and bald-headed gentlemen here will remember that all our grade crossings with other roads were protected by a ball signal or some other similar appliance. That was not good enough. We copied from England the interlocking signals and our different railroad commissioners said: "If you install the interlocking signals we will not require you to make what in Massachusetts is known as the Know-nothing stop." (The Know-nothing stop does not get its name because it is not known, but because the Know-nothing party was once in power and made a few laws.) After we installed the interlocking signal the public was entirely dissatisfied because at every grade crossing where we stopped before, we now only had to slow up so the engineer could see the signal. That was too slow in Massachusetts (I don't know how it would be in Illinois) and they insisted on our installing something else, and we put in a distant signal. It was simply a signal to indicate the position of the home signal. Now an engineer comes up and finds the distant signal at caution. The rules of many railroads require that he shall reduce speed. At a great many points when the engineer sees the distant signal at caution he can immediately see the home signal at safety. The rule requires him to reduce speed, but anybody would call him a fool if he did it. (Applause and laughter.) He breaks a rule. If we were to say to that man: "The position of the distant signal is simply an indication of the position of the home signal." And if he could see the home signal at safety he could disregard the distant signal as he does now and it would be all right; no rules would be violated; but we only say: "The distant signal with the arm in a certain position indicates caution." What possible idea does the distant signal at caution and the home at safety convey to the mind of the engineer, except that the signal man is too lazy to pull the distant signal? (Laughter.) Is that engineer, in this case, any more imprudent than the man who disregards the Indiana law? (Laughter and applause.) He doesn't see the necessity of the rule as you do not the law. (Laughter and applause.) I don't intend

to be facetious; this is a serious matter, but this is a common enough principle. We read about men disregarding rules, but I tell you, gentlemen, those are the kind of rules they disregard.

I firmly believe, although, as I said before, this may be sacrilegious, if we regard our men as craftsmen who have learned their trade, just the same as the plumber, we would have much less trouble. If we say to a man, "A certain signal is an indication of conditions ahead," I would leave it to his judgment as to what is the right thing to do, just as you leave it to the judgment of the plumber, if he finds a knot in the beam or the floor, to get around it the best way he can. (Applause.)

I should judge before I came in there had been some comparisons made between the discipline on railroads and in the army. Why, bless you gentlemen, did you ever consider for one moment that in a regiment of a thousand men there are more officers than all the General and Division officers on a railroad employing twenty-five thousand men, and did you ever stop to think that when these splendidly disciplined men get out from under the eye of their officers, as was the case in the Brownsville incident, they will raise more kinds of hell than our men ever dared to?

THE PRESIDENT: Gentlemen, we would be glad to hear from anyone else. If there is nothing further we will ask Mr. Park to answer the inquiries and close the discussion paper.

MR. W. L. PARK: Mr. Chairman and Gentlemen: The main point in this question I think is brought out very clearly by the recommendation of the Interstate Commerce Commission to Congress, "All persons traveling on railroads and all men employed on engines or trains are interested in this matter. A railroad manager may have reasons—possibly in some cases, from his own stand point, good ones—for concealing the facts of a wreck, but it is to the public interest that they be disclosed." I think you will note the significance of the words of the Commission. They say quite plainly that the train and engine-men and the public are entitled to protection from the *Management* of the railroads. That is the point that I desire to make here, that the railroad managers and operating officials of this country are on trial; they are up before the bar of public opinion as to their conduct of the railroads. On the Harriman Lines we feel that we have done nearly all that can be done to eliminate accidents. We have constructed in the last three or four years 3,750 miles of automatic electric block signals. A train can move from Omaha to San Francisco in this protection—in the protective zone of those signals, and with almost absolute safety, if the employees will do their part. Mr. Kruttschnitt inaugurated some time ago what is known as "surprise tests." Our General Superintendents, Superintendents and Assistant Superintendents make these tests of efficiency. I have gone out personally and displayed a red light and have had engineers,—some of the best engineers,—go by it.

* In answering Mr. Symons' question, I want to say in this particular case the accident was first investigated by the Division Superintendent and the Division Master Mechanic and Engineer, constituting a Board of Inquiry so far as the railroad was concerned. There were selected as outsiders on that committee two of the most prominent bankers of Wyoming, the Vice-Presidents of each of the two strongest banks. Now if a man as a banker can judge human nature, if he can disburse in loans thousands of dollars and do it upon his knowledge of human nature, we feel that that man is competent to sit on an investigation. We don't expect him to be technical. He has, perhaps, no particular knowledge of railroading, but he has "horse sense." He certainly knows whether anything is being covered up. In this particular accident the papers have attacked the railroad but they have not attacked the two local men—the bankers. We then went outside, however, of all the local influences that might surround the case in that particular locality, and secured a new board. As to the two army men: General Baldwin has the unique distinction of wearing three medals of honor,—one of which was voted by Congress for extraordinary bravery in the Civil War; one in the Indian wars and one in the Philippines. In his long years of army life he has served on and held many court martials on different phases of military life and must have acquired the ability to sit upon an investigation of this kind and know whether it was being whitewashed. That is true also of Major General Randall, a man of irreproachable character. At the close of that investigation, with these two men upon the board, the papers immediately ceased their attacks and the whole thing was dismissed without any further thought on the part of the public. They were tired of it. They were satisfied. They were satisfied that the accident occurred as these two men and other outsiders had determined, but were still disposed to growl at the railroad—the public would not stand for it, however.

I might add that one of our passenger trains was derailed recently by a land slide near Ogden. A Board of Inquiry, consisting of Mayor A. L. Brewer, Mr. A. R. Heywood, President, Commercial National Bank and also President of the Weber Club of Ogden, Mr. T. D. Wright, of the Standard and Examiner daily newspapers, together with division officials, visited the scene of the derailment and took testimony from all employes interested. The accident caused the death of fireman and train baggageman, and quite serious damage to equipment. No passengers were injured.

The Board of Inquiry exonerated the railroad company and its employes from responsibility, finding that all the rules and regulations of the company had been complied with and all possible precautions taken to prevent accidents of this nature. The slide occurred at a place where there had never been anything of that nature happen before; the track had been properly inspected and thoroughly examined just pre-

vious to the accidents and there were no indications of trouble at that time.

The following letter from Mayor Brewer, written after the Board of Inquiry had made its findings, indicates that our policy of "Publicity for Accidents" is receiving the approbation and commendation of the public.

OGDEN CITY CORPORATION.

OGDEN, Utah, April 7th, 1909.

Mr. W. A. Whitney, Supt., U. P. R. R. Co., City.

DEAR SIR: I have heard a number of our citizens expressing themselves as being highly pleased with the action of the Union Pacific Railroad Co. in appointing a Board of Inquiry to inspect the site of the recent wreck, together with going into the affairs of the recent wreck very closely, and I have failed so far to hear anybody express themselves other than being highly pleased that the Union Pacific Railroad have taken the people into their confidence in making an investigation and becoming familiar with the cause of this wreck. I am inclined to think that no fair minded citizen could arrive at any other conclusion than that this misfortune was absolutely unavoidable on the part of the Railroad Company, showing no neglect of the employers and showing that due precaution was used in every way, not only to avoid what really did occur but what might occur at other points on the Union Pacific road, and I do not know how it appealed to all the people but it certainly has relieved my mind that there is but little carelessness attached to railroading especially where the Block Signals are in use, and it seems to me that you are to be congratulated upon showing to the public that you are not afraid that a Citizen's Committee be appointed as a Board of Inquiry to look into the details of this wreck or any that might occur in the future, and I am inclined to think it will be highly appreciated by all of the people in the inter-mountain country to continue this policy and I am also inclined to think it will not only satisfy the people but will call for special care on the part of the employees of the Railroad Company.

I trust you will accept this letter in the spirit in which it is given not desiring to dictate in any way to you or the Railroad Co., but simply setting out the spirit in which it seems to have been received by some of our leading citizens and myself.

Hoping you will not have any further use for a Board of Inquiry because I know that the Railroad Company is not anxious for any more wrecks. With kind regards, I remain,

Yours very truly,

Signed: A. L. BREWER,

Mayor.

Now as to the question asked by the gentlemen representing the Railroad Review. I don't care to go into technicalities of the air

brake. I have been out for forty days, all over the Harriman Lines, studying air brakes and looking into air brake practice, "K" triples and modern appliances. They had no application to this accident. I will say that I started my railroad career as brakeman and I have held trains by hand down this identical grade, which is not very steep, and can do so tomorrow. The fault was with the engineer in starting down the hill at too high a rate of speed. He was a young runner, and became rattled, improperly manipulated the brake, and the crew failed to do their duty. We had everything necessary there. We had the best air brakes and we had in the train all fine cars of the latest pattern,—steel underframes, and the best locomotive and largest air pumps that can be bought in this country, also an air gage in the caboose—all the appliances that can be furnished to enable a train to be handled safely, and it got away from the trainmen. We simply want them to bear their share of the responsibility; their share of it, mind you, gentlemen,—we pay for all of it; we pay for all the personal injuries, and so far as the lawyers are concerned we throw it wide open. As I said in the paper we don't want anything mysterious about it, anything upon which they can make these vague insinuations to the Court, that something has been covered up. I remember an experience I had some time ago where a sharp lawyer on the other side had obtained a record of the engineer who had caused an accident—the fireman was injured and was suing the Company for damages. The lawyer found that the engineer had pushed a car off of the tracks at a gravel pit sometime; he told that jury what an enormous accident it was, and the difference between a minor accident and the one that was portrayed by this lawyer did not appear to the jury. The small things grew serious in their eyes—magnified purposely.

Now, one point that was made by Mr. Besler, regarding the article in the New York Sun. While I have the highest regard for our men in the train service and they have my sympathy always, and we have just as high class men as any other railroad, still we have some bad ones. I can, with my long experience on that road, pick out half a dozen men who, in my opinion, are unsafe. Now I would like to ask you gentlemen how we can get rid of them. If I should count them out, the grievance committees would be in tomorrow: "What are your charges? Why did you discharge these men?" This intuition, as some call it, is illustrated by a story of four or five new engines that were received by a railroad. A representative of the locomotive works came with them. They were set up around the shop and one of the oldest machinists who was there helping in the work, said to the representative of the locomotive manufacture: "This engine, Number 1, will always have too much lead; Number 2 will always want her nozzle bushed; Number 3, the reverse lever will always work hard," and so on. He watched those engines when they went out on the road, and sure enough, Number 1 had too much lead, and the other engines developed the other difficulties that had been predicted by the

old machinist. The locomotive messenger thought the machinist must be a prophet or the son of a prophet,—he went to him and said: "I would like to have you explain to me how you could prophesy the weaknesses that would develop in these engines." "Why," he said, "I knew who was going to run them." (Laughter and applause.) Now, gentlemen, I think we all have that intuition. I think any competent railroad official knows the weak members of the family; years ago we could drop these men out, but it is growing harder every day to do that.

Now as to this loyalty,—some exception has been taken to my statement that we are not getting the loyalty that we had a few years ago. When I was in the train service I put in a little extra time occasionally, without any thought of overtime. If the road was tied up by washouts or with snow trouble I volunteered with the rest to get out and relieve the company of that disability, without any thought of emolument or terminal time or overtime, or anything of that sort. That is all gone. We now have no one volunteering to do these things.

If a man goes out on the streets with a dark lantern and robs a house, or if he holds up somebody, we consider it a crime and reprehensible. I think there is something more reprehensible that has crept into the service lately on nearly all the roads—the pilfering of freight by those in charge of trains. Now that is certainly not loyalty. We have got to cut this thing out of the service; we have got to get on a broader plane and hold these men morally and individually responsible when they are to blame.

As to the question asked by the gentleman on my right: Our training school for operators consists of the dispatcher's wire looped into six business colleges. All blanks used by operators and agents are supplied the schools. The students are taken into the service of the railroad after a certain percentage of efficiency has been attained and their pay advanced as they increase their capacity for greater responsibilities, until they pass as telegraph operators into the regular pay schedules. An assistant to the Superintendent of Telegraph, who is an expert agent, has supervision of students, and is constantly employed at the schools and on the road installing and starting the boys, visiting them as frequently as possible to keep their learning along the right lines. The method is very successful.

We keep a school of instruction for train and enginemen constantly on the road, consisting of two cars,—one Train Rule and the other Air Brake.

The Chairman asked about the chart. It is a graphic illustration of the lessening of accidents under the system of "Publicity for Accidents." It includes all accidents in which the damage is \$500.00 or over. The locomotive miles per month is indicated: to illustrate, as a maximum of two millions in October, 1907, during which month you will observe no accident of this description occurred. The dimi-

nation is shown in 1908 with only eight avoidable accidents. Our operated road mileage is 3,309.75 miles.

The figures for the year ending June 30, 1906, were obtained from the Interstate Commerce Commission report for the year 1907, Page 155. The figures for year ending June 30, 1907, is typographical error—should read “1908.” See Page 113 Accident Bulletin No. 28, I. C. Com.

Referring to Mr. Calvert’s criticisms: Publicity for Accidents is not claimed to be a panacea. The October exemption from accidents is simply a coincident. The chart should be viewed as a general proposition indicating a diminution over an extended period.

We in the West experience greater indifference at the closing of a heavy fall business—the boomer element have made their stakes and are ready to go south: especially is this true if storms are prevalent, particularly in the high altitudes.

All of our accidents are submitted to public investigation and we have found none yet (nor do we expect that we shall) which cannot be so handled. The highest technical knowledge or best practical experience is not excluded from such boards.

Under our National and State system of jurisprudence, any individual who is eligible for jury duty is selected by lot regardless of educational qualifications to pass on civil and criminal cases of all degrees of importance or intricacies. Those who may be considered especially qualified are selected for publicity of accidents. For instance, in a recent boiler explosion those selected were owners and operators of plants using boilers. The benefit of the outsider is not in assisting in the investigation, but rather in the moral influence and a cessation of insinuations that the investigation has been “whitewashed” or that some individual concerned has been favored by partiality; hence necessitating the one at fault assuming the individual responsibility which may be his due.

I think that is all, Mr. Chairman, of the questions. I thank you. (Applause.)

THE PRESIDENT: I want to thank you, gentlemen, for the interest you have shown in the paper. I believe it has been a treat which we have all thoroughly enjoyed, and I am sure the appreciation has been shown by the way you have remained to hear the discussion and closing remarks. If there is nothing further we will declare the meeting adjourned.

MR. SYMONS: I am sure I voice the sentiments of the entire membership and visiting guests when I say that we all highly appreciate the very interesting paper to which we have listened this evening, and I wish to emphasize my indorsement by suggesting a vote of thanks which I would move be tendered to the author.

Motion seconded, put and carried unanimously.

THE PRESIDENT: If there is no further business I will declare the meeting adjourned.

ADJOURNED.

The David L. Barnes Library

SPECIAL NOTICE.

The David L. Barnes Library of this Club, at 390 Old Colony Bldg., Chicago, is open for the use of members and their friends, and we hope it will be used freely. It is open on week days from 9 a. m. to 5:30 p. m., except on Saturday, until 3 p. m. Books must not be removed from Library, but the Librarian will assist visitors in finding information and will promptly reply to letters from out-of-town members desiring information from the Library. Donations of books and technical publications will be gratefully received.

TRUSTEES OF THE LIBRARY.

OFFICIAL PROCEEDINGS OF THE WESTERN RAILWAY CLUB

Organized April, 1884

Incorporated March, 1897

Library, 390 Old Colony Bldg.

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Chicago, April 20, 1909

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The regular meeting of the Western Railway Club was held at the Auditorium Hotel Tuesday evening, April 20, 1909. President M. K. Barnum in the chair. The meeting was called to order at 8 P. M. The following members registered:

Baird, Wm.	Hibbard, M. W.	Ryder, G. E.
Barnum, M. K.	Higgins, C. C.	Seidel, G. W.
Bement, A.	Hincher, W. W.	Seley, C. A.
Bendixen, J. H.	Hopkins, G. H.	Sharp, W. E.
Borrowdale, J. M.	Hopkins, L. A.	Slater, F.
Bramer, Harry	Hunter, P.	Stack, T. G.
Brown, R. L.	Jett, E. E.	Stark, F. H.
Brown, S. D.	Jenks, C. D.	State, R. E.
Carney, J. A.	Jennings, D. F.	Stocks, T. J.
Chisholm, J. E.	Johnson, C. H.	Stocks, W. H.
Cota, A. J.	Johnson, H. W.	Stott, A. J.
Covert, M. F.	Jones, L. E.	Stubbs, J. H.
Crownover, G. M.	Kellogg, H. F.	Taft, R. C.
De Long, F. T.	La Rue, H.	Taylor, J. W.
De Voy, J. F.	Lewis, J. H.	Templeton, W. B.
Dodd, T. L.	Lickey, T. G.	Throop, W. B.
Dolan, Thos.	Mackenzie, D. R.	Thurnauer, G.
Doud, W.	Macpherson, A. F.	Towsley, C. A.
Ewing, C. J.	Manchester, A. E.	Trieglaff, O.
Flavin, J. T.	McAlpine, A. R.	True, C. H.
Forbes, R. C.	McCormick, A.	Wade, E. W.
Fitzmorris, Jas.	Martin, P. A.	Waldron, H. H.
Frazee, T. R.	Maus, N. R.	Webb, E. R.
Fromm, A. B.	Mehan, J. E.	Wheeler, S. C.
Gardner, J. E.	Miller, Wm.	Williams, C. H., Jr.
Gennett, C. W., Jr.	Moody, W. O.	Willecoxson, W. G.
Graves, F. W.	Monroe, M. S.	Wilson, A. S.
Harkness, F. L.	Motherwell, J. W.	Wilson, L. F.
Harsha, B. R.	Mull, N. H.	Winn, C. F.
Harris, E. K.	Parsons, Otis	Woods, A. C.
Hennessey, J. J.	Raidler, W. P.	Woods, E. S.
		Wolfe, Chas.

THE PRESIDENT: Gentlemen, we will call the meeting to order, and I trust that you will all remember to register by putting a card in the box, the usual form of roll call.

The minutes of the last meeting have been printed and sent out. Are there any corrections that any one wishes to make in those? If not, they will stand approved as circulated.

Next will be the Secretary's report of applications for membership.

THE SECRETARY: Mr. President, I have sixteen applications which were approved by the board of directors this evening. They are as follows:

New Members

Name	Occupation	Address	Proposed by
H. D. Swayze, G. S. & P. A.,	Kalamazoo, Lake Shore & Chi-		
cago Ry., Kalamazoo, Mich.....			A. C. Woods
M. L. Newhall, Repr. G. M. Newhall Eng. Co.,	Chicago, Ill....		J. L. White
Morris B. Brewster, Repr. U. S. Metallic Pkg. Co.,	Chicago, Ill.		A. J. Cota
F. L. Johnson, Supt. C. & B. & Q. Ry.,	Chicago, Ill.....		A. J. Cota
Chas. B. Goodspeed, Repr. Buckeye Steel Castings Co.,	Chi-		
cago, Ill.			F. J. Cooledge
Wilbur D. Arter, App. L. S. & M. S. Ry.,	Euclid, Ohio.....		P. C. Cady
J. A. Meaden, G. M., Paul Dickinson, Inc.,	Chicago, Ill.		E. W. Hodgkins
G. J. Berry, G. M., Pac. Ry.,	Winnipeg, Man.....		J. W. Taylor
Arthur Bridge, Inspector Matts., C., B. & Q. Ry.,	Aurora, Ill.		G. H. Hill
Geo. H. Gilman, M. C. B., Nor. Pac. Ry.,	St. Paul, Minn....		J. G. Bower
Philip G. Darling, M. E., Manning, Maxwell & Moore,	New		
York			W. O. Jacquite
F. J. Keckefoth, Mach. Foreman, C. & N. W. Ry.,	Winona,		
Minn.			G. C. Bingham
John Ball, A. P. A., C. & N. W. Ry.,	Chicago, Ill.....		G. C. Davidson
B. H. Doidge, Supt. Trans., Guanica Central R. R.,	Ensenada,		
Porto Rico			J. P. Callahan
D. A. Faut, M. M., Chgo. City Ry. Co.,	Chicago, Ill.....		J. W. Taylor
Wm. G. Black, M. M., N. Y. C. & St. L. R. R.,	Stony Island,		
Ill.			J. W. Taylor
J. L. Benedict, Consol. Supply Co.,	Chicago, Ill.....		L. A. Hopkins

Resigned

Chas. L. Sullivan, Chicago, Ill.
 L. M. Addleman, R. H. F., C. & N. W. Ry., Tomahawk, Wis.
 J. M. Barr, Norfolk, Va.
 H. T. Herr, Westinghouse Mach. Co., Pittsburgh, Pa.
 J. W. Cain, McCord & Co., Detroit, Mich.
 Wm. McMaster, Indiana Harbor R. R., Chicago, Ill.
 A. M. Clark, Columbia Steel Co., Portland, Oregon.
 E. B. Reynolds, Ce. Supt. Tel., Ill. Cent. R. R., Chicago Ill.
 W. F. Ackerman, M. M., C. B. & Q. Ry., Havelock, Neb.

Membership, March, 1909	1,558
Resignations	9
	1,549
New members approved by Board of Directors.....	17
Total	1,566

THE PRESIDENT: Gentlemen, the paper of the evening has been sent out, although possibly some of you may not have received it, and if so, we have extra copies here which we shall be glad to let you have, as well as recommended changes in the Rules of Interchange.

The paper this evening is entitled "Influence of Ash on Value of Coal in Locomotive Service," to be presented by Mr. A. Bement of Chicago. Mr. Bement is here and I now have the pleasure of introducing Mr. Bement.

MR. A. BEMENT: It occurred to me as the President mentioned the title of this paper "Influence of Ash on Value of Coal in Locomotive Service," that it has little reference directly to locomotive service. The experiments referred to were made with a stationary boiler and a stoker. No such experiments have been made with locomotives, or with any apparatus other than this particular boiler. But these experiments may have a value in connection with locomotive performance.

INFLUENCE OF ASH ON VALUE OF COAL IN LOCOMOTIVE SERVICE.

By A. BEMENT.

All motive power officials, locomotive engineers and firemen are familiar with the trouble occasioned by what is designated as "bad coal," which makes clinkers as well as fills the firebox with ashes,

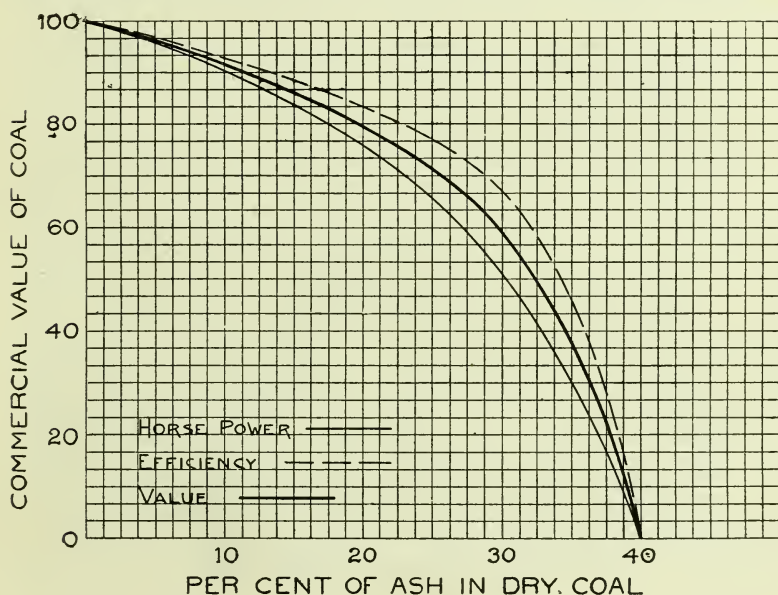


Fig. 1

so that the capacity obtained from the locomotive is very materially reduced, resulting in delays and various other troubles, due not to inferiority in the coal itself, but to the fact that the ash in or associated with the fuel is excessive. But so far as the author is aware, no attempt has been made in railway service to place a definite value upon the effect of variation in quantity of ash, therefore it is the purpose of this paper to more particularly present two diagrams, Figs. 1 and 2, the first illustrating value of coal fuel with varying percentages of ash, and the second, showing the results of experiments from which Fig. 1 is derived.

These experiments were made with a Babcock & Wilcox boiler served with a chain grate stoker. A special lot of four cars of what is known as No. 4 washed coal from Williamson County, Illinois, were provided to insure that no effect produced would be due to irregularity in size. In preparation it was passed over a screen having round perforations $\frac{1}{4}$ inch in diameter, and through a screen having round perforations $\frac{3}{4}$ inch in diameter. The coal as received contained approximately 8 per cent ash. The first experiment was run with this coal in condition as received. In the test of the following day a small quantity of ash-pit refuse was mixed with it, and on each succeeding day a gradually increasing quantity of ash-pit refuse was added to the coal and thoroughly mixed. This process was continued until the efficiency and capacity dropped to zero, or in other words, until there was no

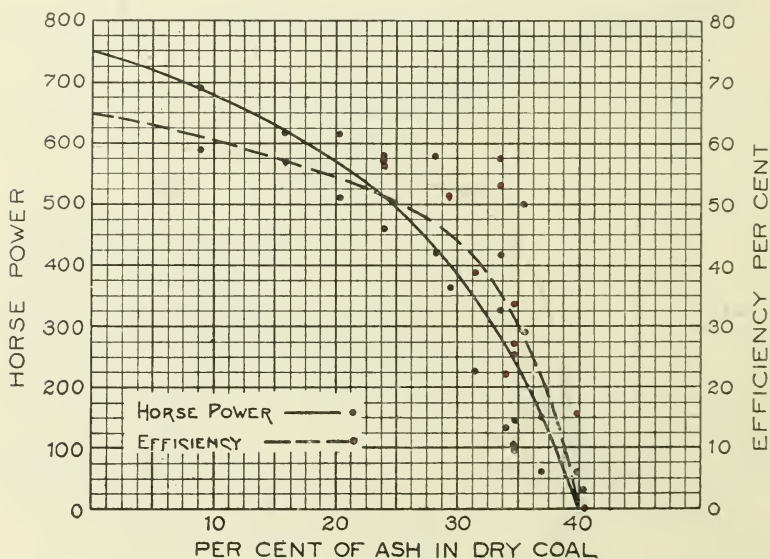


Fig. 2

water evaporated from the coal burned, notwithstanding the fact that 60 per cent of the fuel composition was pure coal.

The above mentioned experiments were conducted by the author for the Commonwealth Edison Company under the direction of Mr. W. L. Abbott of that company, and while they refer to conditions of stationary boiler service rather than that of locomotive, it is the only piece of data of this character which has been produced, although so far as the author's observations have gone, it appears that the conclusions have a useful application in any steam-making service. Some results plotted from tests made by the United States Geological Survey using coal containing ash ranging from 5 to 15 per cent on hand fired grates, conform very closely to the corresponding portion of the curve shown in Fig. 2.

The matter of ash in locomotive fuel may be considered from two standpoints, one, the desirability of employing fuel which is low in ash, the other, the removal of the ash as rapidly as it accumulates, each tending to the same result. It has been the author's experience that by frequently shaking the grate, the ash accumulation could be so disposed of that an engine would come in at the end of a division with the fire in apparently as good condition as when leaving. This, however, added very materially to the labor required on an engine, but more recently, grate-shaking apparatus operated by steam has been proposed and employed to a limited extent.

The whole matter of the ash in locomotive fuel is one of the very first importance, probably much greater than has been realized. The characteristic of smallness in size which cuts a considerable figure in stationary practice is largely absent in the case of locomotives, for the reason that the fine coal is carried out of the stack by the intense draft and does not clog the fuel to such harmful extent, leaving the ash as the greatest cause of trouble with the railroad fuel, which results in many so-called engine failures.

THE PRESIDENT: Gentlemen, you have heard the reading of the paper; it is now open for discussion. There are several aspects of this question of ash and Mr. Bement has presented one in a very clear and graphic manner. Probably many present will have more knowledge of the trouble with ash in locomotive service, with delays on the road, etc. Mr. Seley, will you open the discussion on the paper?

MR. C. A. SELEY (C. R. I. & P. Ry.): I am not very well prepared, Mr. President, to open the discussion. I have read the paper through quite thoroughly, and agree with the author's conclusions to a considerable extent. The efficiency of the coal in the firebox is no doubt varied by the amount of ash and perhaps to a considerable extent by the location of the ash.

In a good many locomotive boilers which have the dump grate in front end under the flues there is no chance to get rid of the ash at that point the same as there is on the rest of the grate, and I believe there is a larger percentage of engine failures due to that fact than

when the dump grate is located at the end of the box and for that reason it has been our practice to gradually modify our grate arrangements, particularly on wide firebox type engines that were originally arranged with the dump grate in front, moving it to the back, and in this way we get a little better control of the ashes at the vital point which controls flue leakage trouble and some engine failures. That was one point that seemed to me to be somewhat of interest in connection with this subject.

MR. FRANK SLATER (C. & N. W. Ry.): I would like to ask the author of the paper if it were possible to get coal that had 40 per cent more ash than the ordinary, if the grate surface were increased 40 per cent, if that would not give the same steam quality as it would with 40 per cent less ash, so that the actual amount of coal would be the same and the result would be the same as far as steam making is concerned.

THE PRESIDENT: Mr. Bement, if it is convenient to you, I think we might ask you to answer the questions as they are raised.

MR. BEMENT: It would not make any difference; the result would be the same in each case. It would be easier to burn up the fuel on a large grate, but there would be no better result.

THE PRESIDENT: Mr. Manchester, will you give your views on this question, please?

MR. A. E. MANCHESTER (C. M. & St. P. Ry.): I would rather wait a little while.

THE PRESIDENT: Mr. DeVoy, perhaps you can give us some experience in this line?

MR. J. F. DEVÖY (C. M. & St. P. Ry.): I have read this paper over quite carefully, and I suppose you know it is perfectly natural for me to take issue with any one, and so I am going to take issue with the writer of this paper on several points he has made.

If I understand and read this right, it would infer that the railroad companies know little or nothing about the contents of ash in their coal. This is absolutely untrue. There is not a coal used, I will venture to say, on 50 per cent of the railroads of the United States that the ash content is not perfectly well known. While I am ready to say that in nine coals I have tested, the content of ash runs between 7.2 and 13.57%, the total agrees quite closely with the experiments stated. The experiments that I refer to were made in the usual way with the B.T.U. and in the crucible, burning the coal for the content of ash, so that in that way the content of ash is known on nearly all roads, at least by the roads with which I have been employed.

Going further than that, in conducting our coal tests, of which we have made upwards of fifty or sixty, using an engine and a stated number of cars over the road, it is the practice to weigh the ash, and right here, gentlemen, let me tell you that the introduction of ash used in this experiment is absolutely unfair and has no bearing on this case at all. I will explain that a little later.

Going further on the matter of tests, to show that we do know the content of ash and what it is, in a series of tests which appears in the proceedings of the Western Railway Club of about four years ago, made by the students of the University of Wisconsin on our road, the contents of ash is given absolutely, so that I think the author is not quite right when he says that he does not know of any such experiments being made, when we make them as a matter of fact, every time, when we want to know anything about coal.

Now, as to the term "ash," to quote the paper, "The whole matter of the ash in locomotive fuel is one of the very first importance, probably much greater than has been realized," and in another part of the paper he speaks of clogging the grates and causing engine failures. It is not the ash that clogs the grates and causes trouble. I inquired for the exact term to-day of our chemist, and while I knew it was the sulphur, he gave me a definition that indicates that instead of the ash, it is the mineral in the coal that causes the clinker and will not allow you to shake your grate, it is not the ash. You know that, whether you know anything about chemistry or bituminous coal or anything else, for the simple reason, if you take any anthracite coal, it is as simple a matter to get rid of the ash as it is to shake the grate, and it is not very hard to do that. I hope therefore that the author of this paper will admit that we do know something about the contents of coal and its probable result.

Now, I may be questioned for stating that the contents of ash can be properly determined by taking a sample from a car and testing it in the manner I have described. That is absolutely true, and we have on record two samples of coal taken from one car, in which the content of ash in the first was five per cent and in the last thirty per cent, so that it is a matter of selecting your coal, but the point I am after is that we locomotive people know absolutely what content of ash there is in our coal, what it will do with the coal and whether it is the ash or something else that is giving the trouble.

Another thing, any one of you gentlemen who know anything about locomotives at all, know—if my understanding of this paper is correct, it is absolutely outside of locomotive practice. As I understand it, ash was mixed with a certain quantity of coal and the fire kept burning until a sufficient amount of ash was added to put the fire out.

We do not do any such thing as that in locomotive practice; the ash is nearest to the grate; we put the coal on top and we can burn that as long as you can get anywhere near a proper combustion, so that again I say that the test referred to in the paper is entirely irrelevant so far as actual practice is concerned. A man does not have to know, if he has five times the grate surface, that he will have the ash distributed over a greater area. I hope before the author gets through he will put us right, will credit us with what we know and what information we have on the subject.

THE PRESIDENT: Mr. Bement, we would like to hear from you in that regard.

MR. BEMENT: In reply to Mr. DeVoy, I do not think he has entirely comprehended the meaning I intended to convey, and when it is stated that as far as I know, no railroad has made experiments which are indicated in the paper, reference is made to the preparation of fuel containing ash in the proportions as given and the conduct of special tests with each lot of fuel. I am perfectly aware that coal is analyzed on all railroads and that the ash content therein is known, but it is an entirely different matter than that treated in my paper.

In practice a distinction is realized in ash as between the clinkers and the fine matter that may be present in the refuse, but the term generally employed originated in the chemical laboratory, and the word ash is applied to all residues after ignition and combustion. It is a fact, of course, that certain portions of the ash are more readily fusible than others; for example, metals, such as iron, form clinkers very readily, while other constituents of less fusibility require a higher temperature for the formation of a clinker, and with some fuel, certain portions of the ash will not fuse under any temperature obtained in an ordinary fire.

MR. F. SLATER: I would like to ask the author of this paper if in his burning of the coal with the ash, the ash that he got at first was not very much more free from clinkers than the last? The reason I ask that question is that I know positively that you can get a coal that has no clinkers in it, but considerable ash, and using that same ash on a live bed of coal with considerable heat you can make clinkers. Any one will find that that tries the experiment. Take an anthracite coal that does not burn too slowly to get a lot of ash, and throw that ash on a live bed of fire and see if you do not get a good solid clinker, or throw the ash on wood, I will guarantee you will get a heavy set of clinkers. It seems to me that the experiment of mixing ash with coal will give you a very large percentage of clinkers along toward the last and might be misleading. I am only guessing at this and would like the information.

MR. BEMENT: There was no difference in the degree of clinker formation in the various tests. A very large proportion of the ash was melted into the form of small, round clinkers and the refuse was quite similar to that usually discharged by a chain grate. It is a fact that as the ash accumulates in an ordinary fire, the formation of clinker becomes greater. This is especially true when the fire bed is disturbed in such manner as to cause the ash to be thrown on the top of it, because it is then heated below and readily melts into clinkers, unless of a low degree of fusibility. So that in the case of readily fusible ash, if the fireman inserts the slice bar and turns the fire upside down, he will immediately produce a serious condition. However, with some of the higher grade coals used on shipboard, which contain an ash of low fusibility, it is the practice to frequently slice the fire from below with

no harmful result, something which could not be done in the case of a fusible ash.

MR. SELEY: I think that the practical value of this paper is mainly the information that can be derived from the upper portion of the curve, which is included within perhaps 20 per cent of ash and by using the efficiency line and the percentage line, we might determine in some cases the comparative value of some different sources of coal. When we go beyond that amount, I feel that the experiment as made is not comparable with locomotive conditions, but under 20 per cent doubtless this curve would represent fairly what we might expect, so that there is, I think, a value in this matter thus far.

THE PRESIDENT: Some of the lignite coals that are found in the Northwest have a great deal of ash and there may be some one here who has had experience with those coals. If so, we would be glad to hear what their practical observations have been. Mr. Manchester, have you made any tests with lignite coal on your line with respect to their efficiency?

MR. MANCHESTER: I am not well enough acquainted with lignite coal. We have not made any careful experiments with it. We have gone far enough into it to feel some of the bad effects of lignite coal, but have not reached a point in our work and handling of it that would enable me to discuss it in connection with the paper. I have noticed this, with lignite coal, that the different coals have a different residue, some of them leave a kind of a slate formation in the box that shakes through the grate, and others leave but very little in the fire, the ash being carried away with the draft.

THE PRESIDENT: It occurred to me to ask that question, because I recall when I was with the Union Pacific Railroad that road had mines in Wyoming where the coal had a great deal of ash, although it was a good steaming coal and was used regularly on engines from Cheyenne west. That same coal, however, could not be used through Nebraska on account of its throwing an excessive amount of fire, even with the diamond stack. I remember particularly the Hanna coal, which was a good steaming coal, but had a large amount of ash. That was especially impressed upon my mind because I bought a ton of it for use at home and had difficulty in persuading my wife to use it, and finally had to give it away to preserve peace in the family.

Mr. Cota, you have had experience with ash in locomotives, possibly you can give us something bearing on the subject.

MR. A. J. COTA (C. B. & Q. R. R.): I believe we all understand that the presence of ash and clinker in a firebox to any great extent reduces the steaming capacity of the engine. We have had coal to use at times that would soon fill the box with ash: there was no large amount of clinker to be found when the box was finally cleaned out. We have had coal that would fill the firebox with a heavy clinker in perhaps an eighty or a hundred mile run. Now, of the two we found we could get along better with the coal that would simply make the

heavy amount of ash, because that could be shaken out through the grates, while with the coal that produced a large amount of clinker, it would stick on the grates and prevent air from passing through. I do not quite understand the point made by the author that the result of ash and, I take it, clinker in the box, or the presence of ash in coal is not understood by the railroads, because I believe that every prominent railroad company in the country is having coal analyzed to see what percentage of ash the coal contains. I have not seen this paper until this evening, and would not care to discuss it.

MR. BEMENT: It is a fact that a small amount of ash which will readily fuse into clinkers, is much more harmful than a larger quantity of non-fusible ash. The worst trouble I ever experienced with a fire occurred when using coal containing less than 5 per cent ash on a stationary grate, but it was of an extremely fusible nature, so that the openings in the grate bars were entirely closed, and not until the lapse of six or seven hours was there a sufficiently large accumulation of clinker for its removal to be possible.

It certainly is not my intention to intimate that railroad officials do not know that the formation of clinker in the firebox or the presence of an excessive amount of ash is not harmful, but I do state that I do not believe that any railroad is in the possession of data which tends to place a definite value upon such an effect.

As I have said before, I am quite well aware that it is common practice with all roads to analyze the coal purchased for locomotive service.

THE PRESIDENT: I think Mr. Bement made a statement in the first part of his paper which has possibly been overlooked. He says, "so far as he is aware, no attempt has been made in railway service to place a definite value upon the effect of variation in quantity of ash." While experiments may have been made in that line, I have not seen any curves plotted which place a definite value on ash. There is no question about the value to our railroads, especially to those that have mines on their own lines, of an analysis showing the quantity of ash, but the relative fuel value as affected by the ash may not be so generally understood and it is that point which Mr. Bement makes especially, is it not, Mr. Bement?

MR. BEMENT: Yes, that is the idea exactly, Mr. President.

MR. DEVOY: Just one word before we close. The question has not been answered to my satisfaction as to whether the ash was mixed with the coal as it was fired in the boiler. I asked that question for this reason, that it does not make any difference whether it was stationary boiler practice or what it was. So far as that is concerned, I believe the majority of railroad people know about as much about the stationary engine as they do about the locomotive, so that if the ash was deposited with the coal and fired from the top or any place, it ought to act the same on any other kind of grate; whichever way it was done, it was entirely irrelevant, it was immaterial, and, as the lawyers say, had no bearing on the case. We do not fire coal that way, so that

before we get through with this matter now we want to clear up how this coal was fired, because if you fire coal in on the top of almost any grate, whether it is a down-draft or up-draft or what it is—and the ash generally is segregated from the coal and there is a chance for it to burn, where, to mix the ash with the coal would certainly kill the whole thing and it would be entirely at variance with any practice, no matter what it as. I want to know how it was mixed.

MR. BEMENT: The procedure in these tests was as follows: Previous to each day's test a calculation was made to ascertain how many pounds of refuse should be added to each wheelbarrow of coal, these wheelbarrow loads weighing 300 pounds. This was done so that the amount of ash in the fuel to be tested would be approximately known. This ash was then spread on the floor in a pile by itself and pounded up by one set of men who afterwards mixed it thoroughly with the coal. This process was repeated, adding the same quantity of ash for each wheelbarrow load of coal. The prepared fuel mixture used in a test was, of course, sampled continually during the period of the experiment, and this sample was afterwards analyzed in the laboratory and the actual ash value determined. A test occupied an entire day, and the process was repeated each succeeding day in the same manner, except that the amount of ash added to the fuel was continually increased.

MR. DEVOY: I say, the question seems one that does not apply to us. It does not apply to methods in use in firing and is not one that would be a good, rational method for a good fireman, or man handling coal in any way.

THE PRESIDENT: Are there any further remarks on the paper? If not, Mr. Bement, have you anything to add in closing the discussion?

MR. BEMENT: It is a fact as Mr. Seley states, that the portion of the curve which has direct application to locomotive service is included with that portion below 20 per cent ash. This refers to fuel in its original condition as fired, but when there has been an accumulation of ash on a locomotive grate, percentages raise much higher than 20 per cent, so that under some conditions an engine goes dead, due to a dirty fire. Under such circumstances the conditions approach those indicated by the portion of the curve between 20 and 40 per cent ash.

I might add just a word regarding the location of these curves. We have had a great deal of controversy over the matter. You will observe in Fig. 2 that the points of efficiency ran out with a comparatively small drop with ash up to 30 per cent or so, and that they then take a sudden drop to zero, although the curve is not drawn in this manner, and in this connection it is well to say that the U. S. Geological Survey has stated that the presence of ash in fuel has only a small influence on efficiency, but that it has a large influence on capacity. It may be that further study of the matter will show that the curve of efficiency should be drawn in a somewhat different manner than I have presented it.

THE PRESIDENT: Gentlemen, this is the meeting at which it has always been customary to consider recommendations of the committee for the revision of the M. C. B. Rules of Interchange, and we will now take that up as the next order and in accordance with the custom established some years ago, I will ask the Vice-President if he will take the chair during this part of the proceedings.

(Mr. W. E. Sharp in the chair.)

THE SECRETARY: Mr. Goodnow, Chairman of this committee, is in New York tonight, and therefore unable to be present. I would suggest that Mr. LaRue, a member of the committee, take charge of the paper while I call out the Rules of Interchange.

THE CHAIRMAN: If that is the sense of the meeting, we will proceed with this report and the Secretary will read the rules in their regular order, and we will ask Mr. LaRue to read the recommendations of the committee as the rules are called.

THE SECRETARY: I would also like to suggest that if any members have any changes to suggest that are not in the report of the committee, they will make the suggestions as the rules are called out.

Are there any suggestions to make in regard to the preface?

MR. LARUE: The committee has something in reference to the preface.

The rules should be divided into three separate headings, viz. rules relating to

a. Interchanging Freight Cars

b. Instructions to Repair Men

* c. Instructions for Billing

and the rules relating to these headings should be brought together.

This suggestion was offered by the Committee for the reason that it was thought that it would be much handier for the inspectors and others if the Arbitration Committee could separate all the rules and place them together as outlined in this suggestion.

THE CHAIRMAN: You have heard the recommendations of this committee. What is your pleasure?

The motion was made to adopt the recommendation.

MR. J. E. MEHAN (C. M. & St. P. Ry.): Having been admitted to the membership of this Club only two months ago, I trust you will not consider it presumptuous for me to take the floor at this time. It seems to me that the present manner in which the rules are divided is working very satisfactorily. There are many things in the present rules, for instance, the rules with reference to wheels: now, it is a very nice thing to have the rules with reference to wheels all together. There are portions of the wheel rules that would be considered as coming under the heading of interchanging of freight cars at the same time they are instructions to repair men. If we were to divide them under Sections a and b it would divide the wheel rules instead of keeping them together. The same thing is true with reference to the

air brakes and many other portions of the rules. Not very long ago the rules were divided up into their present form and I noticed it took repair men, inspectors and clerks a very long time to get accustomed to them, so that I consider it very objectionable to have the rules rearranged without a very good reason.

MR. LARUE: I will say for the information of the gentleman that that was taken into consideration, and the length of time it took the inspectors, the ones who are specially interested, to get familiar with those rules was because they were cut up so. The idea was to get the interchange business of freight cars all under one heading and then the interchange men would have to look no further for their instructions. The same way with the repair men, also with the clerks in billing. You will notice through your rules that you have instructions to your inspectors and interchange men in one part of the rules and in another part of the book there are rules that have some bearing on the same subject. We do not undertake to say what changes should be made, but it was a suggestion put up to the Arbitration Committee whether it was advisable or not.

MR. J. J. HENNESSEY (C. M. & St. P. Ry.): The Arbitration Committee does not have much to do, and I am a little bit disappointed that this committee that only meets once in a year should attempt to shift this responsibility to the Arbitration Committee. Why don't they undertake the job themselves.

MR. LARUE: The committee felt that it was not equal to the task, nor had it the experience the Arbitration Committee has had in such matters, but it felt that the Arbitration Committee ought to be willing to help out these committees that dig up the ideas.

THE CHAIRMAN: This recommendation is before you, gentlemen. It is not seconded as yet.

MR. F. H. STARK (Pittsburg Coal Co.): In order to save time, I would move that the chairman of the committee go ahead with the recommendations of the committee, unless there is some objection and at the close of the reading, we adopt them as a whole. You will find it will save time if he will just read a paragraph and pause a moment and then go on.

THE CHAIRMAN: Is that the sense of the meeting? If it is, we will proceed in that way.

Motion seconded.

THE CHAIRMAN: You have heard the motion by Mr. Stark that the chairman of the committee read the suggestions and recommendations and that we vote upon them as a whole at the close. Are there any remarks? If there are none, those in favor of the motion signify by saying aye; contrary, no.

Motion carried.

MR. LARUE: It is suggested that in the second paragraph of the preface, the word "should" be changed to "must", making it more emphatic what action should be taken.

THE SECRETARY: Rule No. 1, 2, 3.

MR. LARUE:

RULE 3, PAGE 4:

That the rule be modified to designate the journal in order to facilitate billing for removal of wheels, journal boxes and contained parts, etc., by the addition of the following paragraph:

"Facing the 'B' end of car the journal boxes in their order on the right side of car shall be known as 'R1,' 'R2,' 'R3,' and 'R4,' and similarly those on the left side of car shall be known as 'L1,' 'L2,' 'L3,' and 'L4.'"

THE SECRETARY: Rule No. 4, 5, 6, 7.

RULE 7, PAGE 8:

Your committee would respectfully renew the recommendation made last year, making the rule read as follows:

"Shelled out: wheels with defective treads on account of pieces shelling out; if the spots are over $2\frac{1}{2}$ inches or are so numerous as to endanger the safety of the wheel on cars of under 80,000 lbs. capacity and 2 inches on cars of 80,000 lbs. capacity and over."

MR. STARK: I believe this is a suggestion that merits very close consideration. We have drawn the lines closer from year to year in regard to the flange thickness; this was wise, for the reason that flange failures were common, resulting in derailments and wrecks. We have reduced the average life of wheels under 100,000 capacity cars down to about one year and a half. If you place further restrictions, it will increase the number of wheels on account of slid flat spots possibly 25 per cent. Before we do that we ought to raise the question as to whether the dangers would warrant this last increase in expense. I can recall when we were about to increase the dimensions back of the coupler horn on our couplers, when we threw up our hands in holy horror, we thought it would be criminal to increase the dimensions of those parts. When the late Mr. Barr asked if there was a man in the house that had ever known a coupler head to work off in transit, and cause a wreck, there was not a man that from personal knowledge ever knew of such a thing. I would like to ask whether there is a man here who has ever known personally of a wheel failing on account of a slid spot under a 100,000 capacity car $2\frac{1}{2}$ inches long, or if he knows from personal knowledge of a rail failure. The American Railway Association is now securing data on the subject of rail failures and they will determine perhaps whether slid flat wheels have any bearing on the subject, but until we get some information, it seems to me we ought to go a little slow, because to remove wheels for less than $2\frac{1}{2}$ inches will increase the wear of wheels. I come from a territory where it is mountainous; this suggestion is made by a member of the Pittsburgh club who represents a level road. The matter was considered by the Committee of the Railway Club of Pittsburgh; there were four Pennsylvania R. R. representatives, there was a representative of every

road running into the Pittsburg territory and all were of the same opinion, that it was not necessary to condemn wheels any closer than we do now, and in our territory we have more slid wheels than they do in level country and the dangers are enhanced. Mr. President, I would move you that this recommendation be not concurred in.

Motion seconded.

THE CHAIRMAN: You have heard the motion; are there any remarks? If not, all in favor of the motion will signify by saying aye. The motion is carried, the recommendation of the committee is defeated.

THE SECRETARY: Rule No. 8, No. 9.

MR. LARUE: In rule No. 9 the same recommendation is made as in rule No. 7.

RULE 9, PAGE 5:

Your committee would renew the recommendations made last year, namely:
"Worn through chill: when the worn spot exceeds $2\frac{1}{2}$ inches in length on wheels of cars under 80,000 lbs. capacity and 2 inches on cars of 80,000 lbs. capacity or over.

MR. STARK: I will make that motion covering all the paragraphs in regard to slid flat wheels.

THE CHAIRMAN: That will be accepted as the sense of the meeting, unless there is objection.

MR. LARUE:

RULE 10, PAGE 5:

It is recommended that this rule be changed to conform with the leaflet sent out by the Arbitration committee Sept. 22, 1908, making the rule read:

RULE 10:

"Worn flange: cast wheels under cars of less than 80,000 pounds capacity, with flanges having flat vertical surfaces extending more than 1 inch from tread, or flange 15-16 inch thick or less, gauged at a point $\frac{3}{8}$ inch above tread. Wheels under cars of 80,000 pounds capacity or over, with flanges having flat vertical surfaces extending more than $\frac{7}{8}$ inch from tread, or flange less than 1 inch thick, gauged at a point $\frac{3}{8}$ inch above tread (see Figs. 4 and 4a).

"Worn flange: steel and steel-tired wheels with flanges having flat vertical surfaces extending more than 1 inch from tread, or flange 15-16 inch thick or less (see Figs. 4 and 4a)."

It is also suggested that the drawing of wheel defect gauge (Fig. 1, page 7), be modified by the insertion of the dimensions $\frac{3}{8}$ inch to show the exact point of contact of gauge against the throat of worn flange when used in the position shown in Fig. 4, page 10.

THE CHAIRMAN: Any remarks upon this recommendation?

THE SECRETARY: Rule No. 11, 12, 13, 14, 15, 16, 17, 18, 19.

MR. LARUE: This is already covered by the disposition of the suggestion under Rules 7 and 9.

RULE 19, PAGE 8:

The recommendations of last year are respectfully renewed, making the rule read:

"Flat sliding: if the spot caused by sliding is $2\frac{1}{2}$ inches or over on wheels on cars under 80,000 lbs. capacity and 2 inches on wheels on cars of 80,000 lbs. capacity or over."

Should the proposed changes in rules 7, 9 and 19 be finally adopted by the M. C. B. Assn., a change should be made in the wheel defect gauge, Fig. 1, page 7, to measure the two inch flat spot as well.

THE SECRETARY: Rule No. 20, 21, 22, 23, 24, 25, 26, 27, 28.

MR. LARUE:

RULE 28, PAGE 16:

It is suggested that the words "*or bolts*" be added to this rule, making the last phrase read "regardless of the previous condition of the bearings or *bolts*."

This suggestion is made to conform with decision in Arbitration case 719.

THE CHAIRMAN: Any remarks upon the recommendations?

MR. MEHAN: I hardly believe that bolts should come under the same heading in this rule as journal bearings. The rules were changed in 1901 to add "regardless of previous condition of the bearings." That was brought about by the fact that if a wheel was slid or the journal cut, the brass was billed against the car owner at that time, because the delivering line which was responsible for the slid wheel or cut journal was apt to draw the line pretty fine in calling the bearing worn out. In reference to the previous condition of the bearings it is a fact in a large majority of cases in renewing wheels under foreign cars, different axles are put in and the same bearings will not fit the new journals, although the bearings removed from the car were very far from being worn out. I do not think the same thing applies to bolts, and if you say "regardless of previous condition of bolts," it seems to me it is a pretty broad statement. The only reason we can change bolts is when they are broken or stripped. Now, if the bolts could be reused, you do not mean to say that you could bill the car owner for new box bolts. It is a very small thing when you come right down to it, but at the same time little things of this kind are very apt to mislead inspectors and billing clerks and I do not see the need of putting bolts in with journal bearings, and I move that the recommendation of the committee be not concurred in.

MR. LARUE: I believe in 99 cases out of 100, the bills call for bolts as well as bearings, and it is simply confirming a general practice.

MR. MEHAN: In reply to that, rule 28 already allows you to bill for the bolts if they need renewal. Now, why is it necessary to say that you can bill for bolts regardless of previous condition? If the bolts require renewal, you can bill for them, but when you say "regardless of previous condition," the previous condition may be that it is in good shape. It seems to me that the wording would be very misleading, and I do not see what good you can get by the amendment. Whatever good you might have in mind that could be obtained, would be more than offset by the way the men would be misled.

THE CHAIRMAN: Mr. Mehan's motion is that the recommendation of the committee be not concurred in. Is there a second to the motion?

MR. STARK: I believe both these gentlemen are right. It is intended to provide that in case bolts are damaged in removing, that they

can be charged, while it is not expected that we would charge for bolts if the bolts removed are found to be good. It is just simply drawing the line; it was not intended to charge for bolts regardless of whether they were good, but in case they were damaged in removing, to make them chargeable.

THE CHAIRMAN: Any further remarks? If not, the motion before the house is that the recommendation of the committee be not concurred in. All in favor say aye; contrary no.

Motion carried.

THE SECRETARY: Rule 29, 30.

MR. STARK: I would like to suggest that in rule 30, we eliminate "torn air hose." I think Mr. Hennessey will bear me out that a number of years ago torn air hose was a delivering company's responsibility, and one of the Arbitration Committee told me that in considering some changes they inadvertently got the air hose among the owner's responsibilities by mistake. We all know that air hose is torn as a rule by reason of the fact that cars are separated without uncoupling the air hose. The Westinghouse Air Brake people admit that the air brake coupling under normal conditions is automatic, but under other conditions it is not automatic, especially when under air pressure, and again in the winter time when the hose is covered with ice. The pulling apart of the air hose causes torn hose. The Railway Club of Pittsburg recommends that torn air hose be made a delivering company's defect, and I would like to have Mr. Hennessey state whether he believes that is right or not.

MR. HENNESSEY: Mr. President, I hardly feel at liberty to discuss this question tonight. I am on the Arbitration Committee, and I want to be in a position so I can look at the different recommendations of the different clubs throughout the United States without bias. If I would sustain the Pittsburg Railway Club and Western Railway Club, I might possibly feel that if other reasons were brought to my attention, well, I have committed myself once and I would like to stay by that decision, consequently I do not think it is fair to call on me to discuss the rules tonight. The only objection I made was to this committee attempting to shift a great amount of labor and responsibility on the Arbitration Committee that belongs to themselves.

MR. MANCHESTER: The spirit of the rules in relation to owners' or delivering company's responsibility is based on the quality of the material used. If there is any class of goods that a railroad company or anybody else uses that has a great variety of values in itself, it is rubber goods, and I believe for that reason that it is a good proposition to leave it right where it is now, owner's defects.

MR. LARUE: Do you make that as a motion?

THE CHAIRMAN: It is not necessary, the other motion was not seconded. Are there any further remarks on that recommendation? If not, we will pass on.

THE SECRETARY: Rule 31, 32, 33.

MR. LARUE:

RULE 33:

It is suggested that all the requirements regarding air brakes, air brake hose, and the train line now covered by Rules 33, 34, 37 and 38 be modified and incorporated in this rule, making it read as follows:

"Cars equipped with air brake hose other than M. C. B. $1\frac{1}{4}$ inch standard and so branded (owners responsible), except cars offered in interchange, where delivering company is responsible.

"All cars not originally equipped with retaining valves, owners responsible.

"All cars offered in interchange must be equipped with air brakes and fitted with M. C. B. standard $1\frac{1}{4}$ inch train line."

MR. MEHAN: I believe the committee made a slight error in stating an inch and a quarter. By referring to the Master Car Builders' specifications, you will find it is $1\frac{3}{8}$ inches, and the cut of the label on those specifications also calls for $1\frac{3}{8}$ inches, so that I think that size should be specified.

MR. LARUE: It is called one and a quarter-inch hose; that is a common expression.

MR. M. K. BARNUM (C. B. & Q. R. R.): There are several large railroad companies using air brake hose not made in accordance with the M. C. B. specifications, therefore cannot properly be so branded. They seem to have been carefully made and are reliable and prove to be better than the M. C. B. specification hose, and I would therefore move that that paragraph be omitted.

Motion seconded.

MR. LARUE: Which paragraph?

MR. BARNUM: The first paragraph "Car equipped with air brake hose other than M. C. B. $1\frac{1}{4}$ inch standard and so branded," etc.

MR. LARUE: How are you going to tell that it conforms to the M. C. B. standard unless it is marked?

THE CHAIRMAN: The motion is opposed to the M. C. B. standard hose on the ground that the hose they are using is better than the standard hose.

MR. LARUE: How are you going to pass it in interchange?

MR. BARNUM: Are they not passing it at present?

MR. LARUE: How are you going to pass it under the rules?

THE CHAIRMAN: Any remarks further upon this motion? The motion is that the reference by the committee to M. C. B. standard hose be not concurred in. All in favor of that motion will signify by saying aye. Contrary no.

Motion carried.

THE SECRETARY: Rule 34.

MR. LARUE:

RULE 34, PAGE 17:

It is suggested that this rule be eliminated as it is entirely covered by the proposed change in Rule 33.

THE SECRETARY: Rule 35, 36, 37.

MR. LARUE:

RULE 37, PAGE 17:

It is suggested that this rule be omitted as it is covered by the proposed modification and revision of Rule 33.

THE SECRETARY: Rule 38.

MR. LARUE:

RULE 38, PAGE 18:

It is suggested that the second paragraph of this rule relating to retaining valves be omitted owing to its having been added to Rule 33 in this proposed revision.

THE CHAIRMAN: Any remarks?

THE SECRETARY: That is already covered. Rule 39, 40.

MR. LARUE:

RULE 40, PAGE 18:

It is suggested that the first sentence of this rule be changed to read:

"Steps, ladders, handholds or running boards in bad order or insecurely fastened, or absence of grab irons, handholds, *M. C. B. couplers or their attachments*, as required by law."

THE CHAIRMAN: Any remarks upon this recommendation?

THE SECRETARY: Rule 41.

MR. LARUE:

The addition to this rule of "*M. C. B. couplers or their attachments*" is intended to include in this one rule all reference to parts covered by the safety appliance law, and to make rule conform to the present practice in interchange in requiring possessors of cars to make repairs before offering or moving car in interchange.

RULE 41, PAGE 18:

It is suggested that the last sentence be changed to read as follows:

"The size and character of cards which may be used on freight cars may be divided into four classes, viz:

"1. Routing Cards: cards bearing information required by the railroads, such as initial and number of cars, consignee, destination, consignor, contents, point of shipment, route, etc.

"To be of cardboard, size, vertical dimension maximum 5 inches, horizontal dimension maximum 8 inches.

"To be permitted on all loaded cars.

"No picture or trademark to be permitted.

"Space for railroad information to occupy lower three-fifths of card.

"Any printing on the upper two-fifths to be limited to letters not exceeding one-half inch in any dimension.

"All printing to be in black ink.

"A copy of card, in reduced form, is shown herewith.

"2. Special Cards: required by the Regulations for the Transportation of Explosives formulated by the Interstate Commerce Commission and the Regulations for the Transportation of Inflammable Articles and Acids prescribed by the American Railway Association. They shall be used, be of the text and size described, and be attached to cars as prescribed by said regulations.

"3. Symbol (*e. g.*, fast freight line, manifest freight, etc.), and various *M. C. B.* cards: cards prescribed by individual roads for special purposes. Their size, use, text and method of application will be prescribed by each individual road to suit its requirements.

(Name of Consignor, etc.)

(Name of Consignor, etc., in letters not more than one-half in any dimension)

Initial and No. _____ Contents _____

Point of Shipment _____ R. R. _____

Consignee and Destination _____

Via _____

Date _____

"4. Special cards: cards required by United States Customs Regulations or by State authorities, such for example as quarantine regulations, and must be used as prescribed by the United States Customs Regulations."

THE CHAIRMAN: Any remarks upon Rule 41?

THE SECRETARY: Rule 42, 43, 44, 45.

MR. LARUE:

RULE 45, PAGE 19:

It is suggested that this rule be changed to read:

"Cars equipped with M. C. B. couplers having pocket rear-end attachments and so stenciled, if found with stem or spindle attachments instead of pocket, or single pocket attachment in place of tandem. Also cars equipped with 5x7 shank couplers, and so stenciled, if found equipped with any other size shank coupler."

The suggestion for an addition to this rule, making the delivering line responsible for coupler rear end attachments, etc., is to prevent the too common practice at the present time of making repairs by putting in short pockets with single springs, thus penalizing roads making such repairs by making them card for same in interchange of car. The same reason applies in the case of small shank couplers and is in line with Arbitration cases 725 and 748.

THE CHAIRMAN: Any remarks upon this?

MR. MEHAN: The present rules say that the intermediate road is not responsible for any wrong repairs. Now, you wish to hold the intermediate road responsible for certain wrong repairs that they do not make; it would be just as consistent to add that the intermediate road be held responsible for sills that are too small or draft timbers that are not up to the right size, or mixed oil boxes. That is not the worst of this recommendation. In Chicago, where cars are switched back and forth on record it would mean that you would have to get your defect card for wrong repairs instantly upon receiving the car in interchange. That means holding up the cars to obtain such card. If we accept a car at Chicago with record of wrong repairs it goes to Milwaukee and we deliver it to the Wisconsin Central or Northwestern

they will demand our defect card, and if we depend upon getting an offset card from the party delivering the car to us at Chicago we could not make our bill on that offset card until the bill was made against us, because the rules say "Do not make any bill except for repairs actually made." So I do not see why this should be put in. I think it a hardship, and move that it be not concurred in.

MR. LARUE: It was brought to the attention of the committee that there was such a great loss, that the owners of cars went to heavy expense in equipping cars with either tandem springs or friction devices, which would go on foreign roads and come back with other devices and there was no way of telling by joint evidence where the repairs were made and they were seldom caught. This feature was impressed so hard upon the committee they felt it should be presented to the Arbitration Committee.

THE CHAIRMAN: The motion was not seconded. Unless there are other remarks, we will go on with the report.

THE SECRETARY: Rule 46.

MR. LARUE (Reads): It was suggested that this rule be eliminated if the recommendation under Rule 40 were approved. That was approved.

THE SECRETARY: Rule 47.

MR. LARUE (reads recommendation).

RULE 46, PAGE 19:

It is suggested that this rule be eliminated if the recommendations contained under Rule 40 are approved.

RULE 47, PAGE 19:

It is suggested that reference to Rules 34 and 46 in this rule be omitted, as it has been proposed that those rules be eliminated; also, that the rule be changed to read:

"Any company making improper repairs is solely responsible to the owners, with the exception of the cases provided for in Rules 29, 43, 44 and 45, and also in case it should be necessary to replace stem or spindle with pocket attachments; *also uncoupling attachments of M. C. B. couplers.*"

THE CHAIRMAN: Any remarks on this recommendation? If not, we will proceed.

THE SECRETARY: Rule 48, 49.

RULE 49:

It is recommended that the heading before this rule be changed to read as follows:

"Combinations of Damages to Wooden, Steel or Composite Cars which denote unfair usage, if occurring at the same end of car."

And that following Rule 56 some combinations relating to steel and composite cars only, be added as follows:

STEEL AND COMPOSITE CARS ONLY.

"First: Damage to coupler, accompanied by damage necessitating splicing, or renewal of end sill; and splicing, or renewal of two or more longitudinal sills.

“Second: Damage to end sill, side sill, or any part of car, necessitating straightening, splicing, or renewal necessary to put car in serviceable condition; or to properly repair brakes, or safety appliances.

“Third: One or more side stakes raked, or cut more than one-half the depth of the metal; or, damaged, or cut side; if accompanied by bent or broken side stake, re-enforcing strips, or angle, or any sheet requiring repairs, on account of broken, or cut through.

“Fourth: Damage above sills of Composite cars, as per Rule 56.”

MR. LARUE: I might add by way of explanation that these four rules are now being used by a few companies in Chicago as a basis of interchange, but for my part, I am not favorable to the wording of these rules; they seem to me to follow the wording of the rules in regard to unfair usage on wooden cars too closely.

THE CHAIRMAN: Any remarks upon this recommendation?

MR. MEHAN: The only objection I can see to this is the second paragraph, which says, “Damage to end sill, side sill, or any part of the car, necessitating straightening, splicing or renewal,” etc. Very often we get end sills that are just dented by the poling of the cars, and we have had lots of cases of that kind where our men asked for defect cards and they were given to us, but when we get the cars on the repair tracks, we find the repairs are not really necessary and so the defect card is required. It seems to me that is pretty broad when we say “any damage.”

MR. LARUE: These proposed rules were put in to offset that very business, to stop it. You will note that the second rule reads, “Damage to end sill, side sill, or any part of the car, necessitating straightening, splicing or renewal necessary to put car in serviceable condition.” That leaves the decision to the inspector, which in my opinion is wrong. In the third paragraph, “one or more side stakes raked, or cut more than half the depth of the metal”; that takes it away from the inspector and defines his duties, and that is the way I think that those rules should be made. It looks to me like it is going to make a squabble between the inspectors when interchanging cars. One will say the car ought to be repaired and the other will say it is not necessary.

MR. MEHAN: That is the point I wanted to get at. All the other paragraphs are very explicit, with the exception of the second. The second says, any damage to end sill or side sill. Now, we all know these end sills and side sills are slightly bent and we also know that there are defect cards for them and we also know that these repairs are being made and when they get the car home, we find they have taken the whole car apart to take out a very small bend. That second paragraph covers so much that it is too bad that it cannot be made as explicit as the other paragraphs. I therefore move that the second paragraph be not concurred in.

Seconded.

THE CHAIRMAN: It is moved and seconded that the second paragraph of the committee's recommendation be not concurred in.

MR. LARUE: I am not in favor of the first paragraph, I think

they have carried their recommendations too far toward the wooden car.

THE CHAIRMAN: There is a motion before the house disposing of the second paragraph. Any remark upon the motion?

MR. STARK: It seems to me that we are placing the committee in a bad position if we omit one paragraph without furnishing a substitute. These recommendations are right in line with progress and we are interchanging steel cars to-day without any difficulty, and I believe if the matter was referred to the Arbitration Committee, requesting that they frame rules governing interchange of steel cars, that they will take care of these objectionable points. They necessarily will not adopt these recommendations, or both, anyhow, and if the recommendations as made are approved tonight, there will be no harm done. I do not believe it would be a good thing to cut out a part of it; I believe we ought to agree on this and trust to the Arbitration Committee to straighten out the wording.

THE CHAIRMAN: Mr. Hennessey has already volunteered to do all the work. Before voting on that motion, I would like to call attention to the last word in the first line, and the first word in the second line, "necessitating straightening." I believe it is generally accepted that the receiving road is the judge of what should be and what should not be done, and I think the committee discussed it along those lines.

MR. BARNUM: It does not seem to me that that word "necessary" is necessary. I think we have already covered that by "necessitating." I think that "necessary" could be cut out. It would be better English and mean exactly what is intended. The way I should think that ought to read would be "necessitating straightening, splicing or renewal to put the car in serviceable condition."

THE CHAIRMAN: Meaning the word "necessary" in the second line?

MR. BARNUM: It seems to me that has no place there.

THE CHAIRMAN: Do you make that as an amendment, Mr. Barnum?

MR. BARNUM: Yes.

THE CHAIRMAN: The motion was not to concur in the committee's report.

THE SECRETARY: Mr. Mehan, would that be satisfactory, omitting the word "necessary" in the second line under Section 2.

MR. MEHAN: I do not know that that would be a relief; we would be up against the same proposition as we were before. The inspector would think it necessary. He is entitled under that section to demand a defect card, whether the word "necessary" is in there or not.

MR. BARNUM: I do not think it would make the rule any better if we voted it out altogether. I think, however, it would make better English if it is retained.

MR. LARUE: While I am not in favor of the recommendations, I would like to see them go to the Arbitration Committee, because I believe it is in line with progress and we require something like this.

THE CHAIRMAN: The only thing you can do is to withdraw this motion or vote it down.

THE SECRETARY: The motion is that this recommendation of the committee be not concurred in, Section 2.

THE CHAIRMAN: The motion is on the second section. All in favor of the motion signify by saying aye. Contrary, no.

Motion lost.

THE CHAIRMAN: Now, what will you do with the recommendation of the committee? Any remarks further upon it? If not, we will proceed.

THE SECRETARY: Rule 50, 51, 52, 53, 54, 55, 56.

MR. LARUE:

RULE 56, PAGE 20:

First foot note. It is suggested that the first foot note be changed to read:

“The word ‘coupler’ in the above rules 49 to 53 inclusive, means the coupler body *only*.”

This suggestion is made on account of the frequent breakage of knuckles at other than times of other parts forming combinations of defects, and the removal of knuckles at time of repairs on account of combinations such renewals being on account of worn conditions and to get coupler within gauge. Under such conditions the question is raised when bill is presented, whether the knuckle is the only item which would make a combination if considered with other parts repaired.

Third note:

It is suggested that the first sentence of this rule be changed to read:

“It will be assumed that a missing coupler and attachments are *not* damaged unless shown to the contrary.”

This suggestion is made for the reason that in the majority of cases of couplers pulling out, they are in serviceable condition, and further, to make the rule conform to the intent of Rule 87 which permits a labor charge only for replacing coupler, evidently assuming in this rule that the coupler is good for service.

THE SECRETARY: Rule 57, 58, 59, 60, 61, 62, 63, 64, 65.

MR. LARUE: I might say that this has reference to the eight-sill car.

RULE 65, PAGE 24:

Inasmuch as there is a committee of the Master Car Builders Assn., investigating the subject of splicing sills, it is suggested that in the event that that committee should recommend any change in the form of splice, that such recommendations be considered before this rule is finally revised.

It is further suggested that the first paragraph of this rule be modified to read:

“Draft timbers must not be spliced. All longitudinal sills may be spliced once with the exception of center sills, which may be spliced at both ends. Not more than two adjacent sills may be spliced at the same end of car, *except two inside intermediate sills, together with the two center sills at the same end of car, provided that the center sill splice conforms to M. C. B. practice, and such intermediate sill splices can be made between the body bolster and the end sill.*”

This recommendation permitting the splicing of inside intermediate sills in connection with center sills is made for the reason that the intermediate sills act in a load carrying capacity and do not take any of the pulling strains.

It is believed that such practice can be carried out without detriment to the car, and at the same time effect a saving in repairs, as the ends of these sills are often broken on cars requiring repairs of this nature.

THE CHAIRMAN: Any remark on this recommendation?

THE SECRETARY: Have any members any suggestions to make between Rules 65 and 71? If not, the committee's recommendation is on 71.

MR. LARUE:

RULE 71, PAGE 30:

It is suggested that the first paragraph of this rule be changed to read:

"In replacing air brake hose on foreign cars for which bills are made, new *M. C. B. 1¼ inch standard hose, and so branded*, must be used."

This is suggested to make the rule conform to the suggested changes in Rule 33.

Eliminate the second paragraph as it has already been covered by the recommendations of your committee.

THE CHAIRMAN: That is eliminated, I believe, by the previous motion.

THE SECRETARY: Rule 72, 73, 74, 75.

MR. LARUE:

RULE 75, PAGE 31:

It is suggested that this rule be eliminated for the following reasons:

"1st: When the rule was adopted cars with defective ends and couplers were handled in interchange under chains, but this has been discontinued at the present time.

"2nd: The practice of chaining double loads has been discontinued by a large number of the roads, and chains are not being used on cars in interchange, which makes this rule obsolete."

THE CHAIRMAN: Any remark on this recommendation? Proceed.

THE SECRETARY: Have any members anything between 75 and 87? If not, we will take up 87.

MR. LARUE:

RULE 87, PAGE 38:

It is suggested that the word "yokes" in the third line from the end of rule be changed to read "pockets," because the part is better known by this name.

THE SECRETARY: Next recommendation is Rule 125. Have any members anything to suggest between 87 and 125?

MR. LARUE:

RULE 125, PAGE 70:

It is suggested that some provision be made to route cars home by the shortest routing rather than by the route by which car arrived when it became worn out or decayed.

THE SECRETARY: Next recommendation is under the passenger car rules, Rule 3, Section C, of the Passenger Car Rules.

MR. LARUE:

RULE 3, SECTION C:

Would recommend the elimination of this rule for the reason that line expenses and what constitutes same are subject of agreements between the roads at interest in the line.

THE SECRETARY: Rule 4.

MR. LARUE:

RULE 4:

Would recommend that this rule be eliminated for the reasons given in Rule 3, Section C.

THE SECRETARY: Rule 15 is next.

MR. LARUE:

RULE 15 (b):

Would recommend that rule be changed to conform to leaflet issued by the Arbitration Committee, Sept. 22, 1908, and that the words "at last turning" be added after the word "thinner" in next to last line.

THE CHAIRMAN: Those are all the recommendations of the committee, gentlemen, and it will be in order now to adopt the report as modified as a whole. What is your pleasure?

MR. MANCHESTER: I move that it be adopted. (Seconded).

THE CHAIRMAN: Moved and seconded that the report as modified be adopted.

Motion carried.

THE CHAIRMAN: Has any member anything further?

MR. DEVROY: Before we adjourn, I move a vote of thanks of the Club to Mr. Bement for the paper he has tendered here tonight and to the Committee in their efforts on the Rules of Interchange.

Motion seconded and carried.

MR. P. A. MARTIN (National Car Line): In connection with Rule 132, I feel that there ought to be something added to penalize the railroads for deviating from the M. C. B. Rules. I refer particularly to the wilful neglect in not putting on repair cards. I feel that the dishonesty which has crept in on this rule is growing more and more every day and if there were some penalty placed upon railroads for deviating from the rules, it would work a great benefit for car owners. I have found in my experience that the men seemed to take credit, to make charges for repairs that are not done; I have found where that occurred in the presence of railroad officials; I am not prepared to say that the heads of departments encouraged these practices, but I do know this, that we have taken this matter up with different railroads, asking them to investigate what we thought was sharp practice on the part of their men and we get replies by return mail which give evidence that there was no investigation made, to the effect that their men were all honest. Now, I believe that if there were some penalty placed upon railroads for deviating from the rules, that we would get a great deal of benefit from it. It was suggested in another Association that perhaps if railroads found guilty of practices of this kind were suspended from the M. C. B. Association for a period of time,

it would have a very good effect. I think we are coming to it sooner or later, and it might be well enough for the Western Railway Club to go on record to that effect.

THE CHAIRMAN: Have you anything further, gentlemen, before we adjourn?

THE SECRETARY: Before we adjourn, I would like to say one word. Next month is election and installation of officers for the following year. Now, all work and no play makes Jack a dull boy. The Board of Directors have a program that will keep you laughing from 8 o'clock until a quarter to eleven. Be sure to come and enjoy a good smoke and a good laugh.

On motion, the meeting adjourned.

THE SECRETARY: The Report of the Committee on Revision of the Rules of Interchange as modified by the Club is as follows:

REPORT OF COMMITTEE ON REVISION OF THE M. C. B. RULES OF INTERCHANGE.

To the Members:

Your committee has carefully considered the M. C. B. rules of interchange, and would recommend that the following changes and additions are necessary to bring them up to date.

The rules should be divided into three separate headings, viz. rules relating to

- a. Interchanging Freight Cars
- b. Instructions to Repair Men
- c. Instructions for Billing

and the rules relating to these headings should be brought together.

Preface—Second paragraph:

That the word *should* be changed to *must*, making more emphatic what action should be taken.

RULE 3, PAGE 4:

That the rule be modified to designate the journal in order to facilitate billing for removal of wheels, journal boxes and contained parts, etc., by the addition of the following paragraph:

"Facing the 'B' end of car the journal boxes in their order on the right side of car shall be known as 'R1,' 'R2,' 'R3,' 'R4,' and similarly those on the left side of car shall be known as 'L1,' 'L2,' 'L3,' and 'L4.'"

RULE 10, PAGE 5:

It is recommended that this rule be changed to conform with the leaflet sent out by the Arbitration committee Sept. 22, 1908, making the rule read:

RULE 10:

"Worn flange: cast wheels under cars of less than 80,000 pounds capacity, with flanges having flat vertical surfaces extending more than 1 inch from tread, or flange 15-16 inch thick or less, gauged at a point $\frac{3}{8}$ inch above tread. Wheels under cars of 80,000 pounds capacity or over, with flanges having flat vertical surfaces extending more than $\frac{7}{8}$ inch from tread, or flange less than 1 inch thick, gauged at a point $\frac{3}{8}$ inch above tread (see Figs. 4 and 4a).

"Worn flange: steel and steel-tired wheels with flanges having flat vertical surfaces extending more than 1 inch from tread, or flange 15-16 inch thick or less (see Figs. 4 and 4a)."

It is also suggested that the drawing of wheel defect gauge (Fig. 1, page 7), be modified by the insertion of the dimensions $\frac{3}{8}$ inch to show the exact

point of contact of gauge against the throat of worn flange when used in the position shown in Fig. 4, page 10.

RULE 33:

It is suggested that all the requirements regarding air brakes, air brake hose, and the train line now covered by Rules 34, 37 and 38 be modified and incorporated in this rule, making it read as follows:

"All cars not originally equipped with retaining valves, owners responsible.

"All cars offered in interchange must be equipped with air brakes *and fitted with M. C. B. standard 1 1/4 inch train line.*"

RULE 34, PAGE 17:

It is suggested that this rule be eliminated as it is entirely covered by the proposed change in Rule 33.

RULE 37, PAGE 17:

It is suggested that this rule be omitted as it is covered by the proposed modification and revision of Rule 33.

RULE 38, PAGE 18:

It is suggested that the second paragraph of this rule relating to retaining valves be omitted owing to its having been added to Rule 33 in this proposed revision.

RULE 40, PAGE 18:

It is suggested that the first sentence of this rule be changed to read:

"Steps, ladders, handholds or running boards in bad order or insecurely fastened, or absence of grab irons, handholds, *M. C. B. couplers or their attachments*, as required by law."

The addition to this rule of "*M. C. B. couplers or their attachments*" is intended to include in this one rule all reference to parts covered by the safety appliance law, and to make rule conform to the present practice in interchange in requiring possessors of cars to make repairs before offering or moving car in interchange.

RULE 41, PAGE 18:

It is suggested that the last sentence be change to read as follows:

"The size and character of cards which may be used on freight cars may be divided into four classes, viz:

"1. Routing Cards: cards bearing information required by the railroads, such as initial and number of cars, consignee, destination, consignor, contents, point of shipment, route, etc.

"To be of cardboard, size, vertical dimension maximum 5 inches, horizontal dimension maximum 8 inches.

"To be permitted on all loaded cars.

"No picture or trademark to be permitted.

"Space for railroad information to occupy lower three-fifths of card.

"Any printing on the upper two-fifths to be limited to letters not exceeding one-half inch in any dimension.

"All printing to be in black ink.

"A copy of card, in reduced form, is shown herewith.

"2. Special Cards: required by the Regulations for the Transportation of Explosives formulated by the Interstate Commerce Commission and the Regulations for the Transportation of Inflammable Articles and Acids prescribed by the American Railway Association. They shall be used, be of the text and size described, and be attached to cars as prescribed by said regulations.

"3. Symbol (*e. g.*, fast freight line, manifest freight, etc.), and various M. C. B. cards: cards prescribed by individual roads for special purposes. Their size, use, text and method of application will be prescribed by each individual road to suits its requirements.

“4. Special cards: cards required by United States Customs Regulations or by State authorities, such for example as quarantine regulations, and must be used as prescribed by the United States Customs Regulations.”

RULE 45, PAGE 19:

It is suggested that this rule be changed to read:

“Cars equipped with M. C. B. couplers having pocket rear-end attachments and so stenciled, if found with stem or spindle attachments instead of pocket, or *single pocket attachment in place of tandem. Also cars equipped with 5x7 shank couplers, and so stenciled, if found equipped with any other size shank coupler.*”

The suggestion for an addition to this rule, making the delivering line responsible for coupler rear end attachments, etc., is to prevent the too common practice at the present time of making repairs by putting in short pockets with single springs, thus penalizing roads making such repairs by making them card for same in interchange car. The same reason applies in the case of small shank couplers and is in line with Arbitration cases 725 and 748.

RULE 46, PAGE 19:

It is suggested that this rule be eliminated if the recommendations contained under Rule 40 are approved.

RULE 47, PAGE 19:

It is suggested that reference to Rules 34 and 46 in this rule be omitted, as it has been proposed that those rules be eliminated; also, that the rule be changed to read:

“Any company making improper repairs is solely responsible to the owners, with the exception of the cases provided for in Rules 29, 43, 44 and 45, and also in case it should be necessary to replace stem or spindle with pocket attachments; *also uncoupling attachments of M. C. B. couplers.*”

RULE 49:

It is recommended that the heading before this rule be changed to read as follows:

“Combinations of Damages to Wooden, Steel or Composite Cars which denote unfair usage, if occurring at the same end of car.”

And that following Rule 56 some combinations relating to steel and composite cars only, be added as follows:

STEEL AND COMPOSITE CARS ONLY.

“*First:* Damage to coupler, accompanied by damage necessitating splicing, or renewal of end sill; and splicing, or renewal of two or more longitudinal sills.

“*Second:* Damage to end sill, side sill, or any part of car, necessitating straightening, splicing, or renewal necessary to put car in serviceable condition; or to properly repair brakes, or safety appliances.

“*Third:* One or more side stakes raked, or cut more than one-half the depth of the metal; or, damaged, or cut side; if accompanied by bent or broken side stake, re-enforcing strips, or angle, or any sheet requiring repairs, on account of broken, or cut through.

“*Fourth:* Damage above sills of Composite cars, as per Rule 56.”

RULE 56, PAGE 20:

First foot note. It is suggested that the first foot note be changed to read:

“The word ‘coupler’ in the above rules 49 to 53 inclusive, means the coupler body *only.*”

This suggestion is made on account of the frequent breakage of knuckles at other than times of other parts forming combinations of defects, and the

removal of knuckles at time of repairs on account of combinations such renewals being on account of worn conditions and to get coupler within gauge. Under such conditions the question is raised when bill is presented, whether the knuckle is the only item which would make a combination if considered with other parts repaired.

Third note:

It is suggested that the first sentence of this rule be changed to read:

"It will be assumed that a missing coupler and attachments are *not* damaged unless shown to the contrary."

This suggestion is made for the reason that in the majority of cases of couplers pulling out, they are in serviceable condition, and further, to make the rule conform to the intent of Rule 87 which permits a labor charge only for replacing coupler, evidently assuming in this rule that the coupler is good for service.

RULE 65, PAGE 24:

Inasmuch as there is a committee of the Master Car Builders Assn., investigating the subject of splicing sills, it is suggested that in the event that that committee should recommend any change in the form of splice, that such recommendations be considered before this rule is finally revised.

It is further suggested that the first paragraph of this rule be modified to read:

"Draft timbers must not be spliced. All longitudinal sills may be spliced once with the exception of center sills, which may be spliced at both ends. Not more than two adjacent sills may be spliced at the same end of car, *except two inside intermediate sills, together with the two center sills at the same end of car, provided that the center sill splice conforms to M. C. B. practice, and such intermediate sill splices can be made between the body bolster and the end sill.*"

This recommendation permitting the splicing of inside intermediate sills in connection with center sills is made for the reason that the intermediate sills act in a load carrying capacity and do not take any of the pulling strains. It is believed that such practice can be carried out without detriment to the car, and at the same time effect a saving in repairs, as the ends of these sills are often broken on cars requiring repairs of this nature.

Eliminate the second paragraph as it has already been covered by the recommendations of your committee.

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"1st: When the rule was adopted cars with defective ends and couplers were handled in interchange under chains, but this has been discontinued at the present time.

"2nd: The practice of chaining double loads has been discontinued by a large number of the roads, and chains are not being used on cars in interchange, which makes this rule obsolete."

RULE 87, PAGE 38:

It is suggested that the word "yokes" in the third line from the end of rule be changed to read "pockets," because the part is better known by this name.

RULE 125, PAGE 70:

It is suggested that some provision be made to route cars home by the shortest routing rather than by the route by which car arrived when it became worn out or decayed.

PASSENGER CAR RULES.

RULE 3, SECTION C:

Would recommend the elimination of this rule for the reason that line expenses and what constitutes same are subject of agreements between the roads at interest in the line.

RULE 4:

Would recommend that this rule be eliminated for the reasons given in Rule 3, Section C.

RULE 15 (b):

Would recommend that rule be changed to conform to leaflet issued by the Arbitration Committee, Sept. 22, 1908, and that the words "at last turning" be added after the word "thinner" in next to last line.

Respectfully submitted,

T. H. GOODNOW,

W. E. SHARP,

H. LARUE,

J. W. FOGG,

H. H. HARVEY,

Committee.

Chicago, Ill., April 1, 1909.

The David L. Barnes Library

SPECIAL NOTICE.

The David L. Barnes Library of this Club, at 390 Old Colony Bldg., Chicago, is open for the use of members and their friends, and we hope it will be used freely. It is open on week days from 9 a. m. to 5:30 p. m., except on Saturday, until 3 p. m. Books must not be removed from Library, but the Librarian will assist visitors in finding information and will promptly reply to letters from out-of-town members desiring information from the Library. Donations of books and technical publications will be gratefully received.

TRUSTEES OF THE LIBRARY.

OFFICIAL PROCEEDINGS
OF THE
WESTERN RAILWAY CLUB

Organized April, 1884

Incorporated March, 1897

Library, 390 Old Colony Bldg.

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Chicago, May 18, 1909

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The Annual Meeting of the Western Railway Club was held at the Auditorium Hotel Tuesday evening, May 18, 1909. Vice President W. E. Sharp in the chair. The meeting was called to order at 8 P. M. The following members registered:

Albert, C. J.
Alexander, Walter
Allison, W. L.
Ames, C. F.
Anderson, C.
Arlein, E. J.
Ayers, A. R.
Baker, A. F.
Baker, F. L.
Barnes, C. A.
Bentley, H. T.
Borrowdale, J. M.
Bowen, H. A.
Bowman, A. A.
Bridge, A.
Brown, R. L.
Brown, S. D.
Bryant, G. H.
Buskirk, F.
Buker, J.
Callahan, J. P.
Carney, J. A.
Carscaden, C. A.
Chiles, G. S.
Chisholm, J. E.
Cizek, J. J.
Colwell, F. G.
Connelly, W. L.
Cooke, W. J.
Cota, A. J.
Covert, M. F.
Creith, H. C.

Crownover, G. M.
Curtis, J. J.
Dale, Russell
Dangel, W. H.
Denney, G. C.
Dixon, L. L.
Dodd, T. L.
Dolan, Thos.
Elliott, C. F.
Elliott, Vernon
Endsley, L. E.
Ewing, C. J.
Fantom, W. F.
Feldhake, J. M.
Fenn, F. D.
Fitzmorris, Jas.
Flannagan, T. W.
Flavin, J. T.
Fogg, J. W.
Forbes, R. C.
Forsyth, H. B.
Forsyth, J. E.
Forsyth, Wm.
Foster, O. M.
Fowler, W. E., Jr.
Frey, N.
Friedeman, W. F.
Fromm, A. B.
Fry, C. H.
Fuller, C.
Gale, W. T.
Geer, R. B.

Gilpin, G. G.
Goodnow, T. H.
Goodwin, Geo. S.
Graves, R. I.
Hahn, F. W.
Hall, J. E.
Hall, W. B.
Hall, W. F.
Hammond, W. S., Jr.
Haney, W. J.
Hannauer, Geo.
Harris, D. T.
Harsha, B. R.
Henry, W. F.
Hewitt, R.
Hibbard, M. W.
Hincher, W. W.
Hinckley, A. C.
Hinds, J. B. L.
Hodgkins, E. W.
Holcomb, W. B.
Holmes, S.
Hoskinson, H. S.
Humphreys, C. J.
Hunter, P.
Isbester, G. C.
Jacobs, A. L.
Jenks, C. D.
Jett, E. E.
Johnson, J. W.
Jones, L. E.
Kelley, H. D.

Kelly, J. W.	Osman, H. L.	Stimson, O. M.
Kennedy, A. W.	Osmer, J. E.	Stott, A. J.
Kleifges, Geo. A.	Parker, P.	Studer, A.
LaRue, H.	Parsons, Otis	Sullivan, S. F.
Lawson, W. C.	Peck, Chas.	Sweringen, G. N.
Lickey, F. G.	Peterson, C. H.	Sylvester, F. L.
Long, Chas. R., Jr.	Phillips, L. R.	Tawse, W. G.
Lovell, C. P.	Pixley, J. F.	Taylor, C. H.
Lundquist, C. J.	Pratt, E. W.	Taylor, J. W.
McAlpine, A. R.	Price, R. C.	Tetlow, E. W.
McCormick, A.	Ralston, C. A.	Thomas, C. E.
McClain, H. O.	Richardson, C. F.	Thurnauer, G.
Mackenzie, D. R.	Richmond, F. L.	Towner, M. E.
Mackie, J. F.	Ricketson, W. E.	Towsley, C. A.
Macpherson, A. F.	Ridell, Chas.	Van Dorn, W. T.
Madsen, S.	Rosser, W. W.	Vincent, M. M.
Manchester, A. E.	Rowley, S. T.	Vissering, Harry
Marea, M.	Russell, S. W.	Waldron, H. H.
Marsh, H.	Schonthal, B. E.	Walker, E. H.
Marsh, H. W.	Schroyer, H. H.	Walter, A. L.
Martin, P. A.	Seyfarth, E. E.	Webb, E. W.
Meaden, J. A.	Shaw, H. P.	Whitsel, N. B.
Midgley, S. W.	Shumate, F. D.	Wickhorst, M. H.
Mileham, C. M.	Simons, J. E.	Williams, C. H., Jr.
Mills, G. F.	Singleton, A.	Wilson, L. F.
Monroe, M. S.	Sinkler, Jos.	Winn, C. F.
Moody, W. O.	Smith, J. S.	Wolfe, C.
Moore, A. C.	Smith, Robt.	Woods, E. S.
Motherwell, J. W.	Smith, W. R.	Worth, L. A.
Nathan, C. A.	Speirs, Andrew	Wright, A. B.
Naylor, N. C.	Stanton, Geo.	Wright, L. S.
Neff, J. P.	State, R. E.	Wright, Wm.
Nortman, Geo.	Steinke, Edw.	Zachritz, Geo. P.
Olson, O. M.		Zorn, C.

THE CHAIRMAN: Please come to order, Gentlemen. The first order on the program this evening is roll call; we will omit that, but we will ask that every member register at the register box here at the elevator.

Next order of business will be the reading of the minutes of the last regular meeting, but as they have been printed, they will be passed as approved, unless there are objections or corrections.

The next order of business will be the report of our Secretary.

NEW MEMBERS

Name	Occupation	Address	Proposed by
J. S. Lauder, G. F. C. D., L. & N. R. R.,	So. Louisville, Ky.	.....	W. A. Stearns
J. C. Kuhns, A. P. A.,	Illinois Central R. R.,	Chicago, Ill.	J. W. Taylor
Hugh Montgomery, S. M. P. & E.,	Bangor & Aroostook R. R.,		
Milo Jen.,	Maine.	.....	J. W. Taylor
Jas. M. Johnston, M. M.,	St. Louis & San Francisco R. R.,		
Ft. Smith, Ark.	.....		C. P. Cass
Fred W. Brill, Selling Agt.	American Car Co.,	St. Louis, Mo.	J. N. Reynolds
Geo. H. Porter, Western Electric Co.,	Chicago, Ill.	.....	G. H. Bryant
Ralph G. Coburn, Res. Sales Mgr.,	Franklin Ry. Supply Co.,		
Chicago, Ill.			Jos. A. Buker

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Name	Occupation	Address	Proposed by
R. Mackie, Asst. Loco. & Car Supt., Burma Rys., Insein Burma India.....			H. A. Craig
J. J. Cizek, The Leslie Co., Chicago, Ill.....			S. W. Midgley
Joseph Sinkler, Franklin Railway Supply Co., Chicago, Ill.....			J. W. Taylor
Chas. H. Fresher, Franklin Mfg. Co., Chicago, Ill.....			J. W. Taylor
E. R. Rayburn, Franklin Mfg. Co., Chicago, Ill.....			J. W. Taylor
Russell Dale, Carpenter Steel Co., Chicago, Ill.....			W. C. Lawson
C. R. Powell, V. P. Amer. Car & Equipment Co., Chicago, Ill.....			J. W. Taylor
P. H. Wilhelm, Asbestos Protected Metal Co., Chicago, Ill.....			G. H. Bryant
A. L. Canavan, Mech. Dept. Amer. Car & Fdy. Co., Chicago, Ill.....			Andrew Speirs
A. H. Sisson, G. M. Forsythe Bros. Co., Chicago, Ill.....			S. W. Midgley
E. R. Winslow, The West Coast Co., Chicago, Ill.....			T. L. Dodd
A. N. Lucas, Genl. Porter Foreman, C., M. & St. P. Ry., Milwaukee, Wis.....			C. F. Winn
C. H. Belty, C. D., C., M. & St. P. Ry., Milwaukee, Wis.....			C. E. Fuller
M. Toohey, Genl. Loco. Paint Foreman, C., M. & St. P. Ry., Milwaukee, Wis.....			J. F. DeVoy

RESIGNED

E. A. Lewman, Montezuma, Ind.

DROPPED

C. J. Hosmer, Houghton & Richards, Chicago, Ill. Address unknown.

H. G. Duffie, Nelson, Morris & Co., Chicago. Address unknown.

H. J. Ulenbrock, R. H. F., C., B. & Q. Ry., Quincy, Ill. Non payment.

H. H. Swift, G. C. F., C. H. & D. Ry., Lima, Ohio. Non payment.

F. W. Stubbs, Draftsman, Amer. Loco. Wks., Dunkirk, N. Y. Non payment.

A. F. Stetson, Houghton & Richards, Chicago. Non payment.

O. S. Shantz, Detroit, Mich. Non payment.

S. S. Reigel, Draftsman, Treas. Dept., Washington, D. C. Non payment.

F. S. Miller, Machinist, C., B. & Q. Ry., Creston, Ia. Non payment.

W. E. Johnson, Stk., C. & N. W. Ry., Kaukauna, Wis. Non payment.

H. C. Elsner, G. F., B. & O. R. R., South Chicago, Ill. Non payment.

Membership April, 1908.....	1,566
Resigned	1
Dropped	2
Address unknown. Non-payment of dues.....	9

1,554

New members, approved by Board of Directors.....

21

1,575

I have not anything under the head of special notices from the Secretary's desk; I do not know whether any of the members have anything to announce at this time.

If there is nothing else, I will proceed with the Annual Report of the Secretary.

To the President and Board of Directors:—

The report herein submitted is the quarter century report of the Western Railway Club, its twenty-fifth year, a period coincident with the most rapid and wonderful development in railway science the world has ever known.

That the club has advanced and prospered beyond the dreams of that little coterie of men, consisting of B. K. Verbryck, Joseph Townsend, F. A. Bissell, H. S. Bryan, Wm. Forsyth, L. E. Johnson, W. B. Snow, B. McDevitt, A. B.

Pullman, H. C. Buhoup, Joseph Regan, Wm. McConway, A. Dalzell, Chas. E. Ettinger, Geo. Morris and R. B. Crouch, who held a preliminary meeting in Club Room A, Grand Pacific Hotel, Chicago, on February 27, 1884, and took the preliminary steps towards the formation of the club which was formally organized April 16, 1884, is evidenced by its numerical strength today. That it has had no little influence in the railway progress during this period its record will show. That it may still continue an influential factor in the up-building of railway interests is the earnest wish of the undersigned.

The membership of the Club still continues to show an increase. The movement of a good many members from one section of the country to another has resulted in an unusually large number of resignations. About the usual number have had to be dropped from membership for non-payment of dues, as prescribed by our by-laws. Death has terminated the activities of six members. A page will be set apart in our annual proceedings to make record of those who have died during the year.

The membership at present is as follows:

Membership, including April, 1908.....	1,500
Deaths	6
Resigned	87
Dropped for various reasons.....	16
	109
	1,391
New members admitted during year ending April, 1909.....	183
Total membership.....	1,574

The following is a list of those taken from the membership list for various reasons:—

RESIGNED.

W. T. Williams	H. C. May	Robt. Bissett
G. R. Parker	H. E. Wilson	D. Cunningham
T. L. Condron	J. E. Simons	T. I. Taylor
F. V. Whiting	K. J. Bowers	Mord Roberts
A. N. Wilsie	J. C. Steen	T. P. Wilbur
H. R. Linn	A. W. Sullivan	H. M. Wilson
M. Moskowitz	J. M. Snodgrass	A. R. Raymer
E. N. Armstrong	R. B. Fulks	H. P. Latta
H. E. McCormick	I. C. Hubbell	G. H. Brenner
H. J. Helps	F. W. Coale	J. C. Shaffer
B. S. Atkinson	C. M. Muchnic	L. E. Wolgemuth
C. H. Ferry	N. B. Pennock	J. D. Driscoll
H. E. Poronto	L. V. Dabrowski	C. L. Ransom
W. C. Downing	T. E. Warnock	W. L. Jacoby
H. H. Clark	B. McKeen	W. T. Diehl
H. C. Avery	S. W. McMunn	J. C. Fox
G. J. DeVilbiss	J. A. Haley	W. H. Flynn
Chas. Hyland	E. W. Farnham	M. J. Drury
C. Thompson	G. W. Wheeler	S. B. Wight
W. H. Hamilton	C. R. Allison	H. N. Hough
F. C. Green	Wm. Snodgrass	C. L. Sullivan
F. B. Ernst	H. C. Johnstone	L. M. Addleman
T. C. Eayrs	Hugh Bartlett	J. M. Barr
H. E. Tucker	Geo. James	H. T. Herr
A. M. Smith	M. F. Wise	J. W. Cain
G. A. Hagar	J. C. Thorpe	Wm. McMaster
A. E. Swanson	O. F. Zeug	A. M. Clark
J. W. Coneys	A. J. Gillespie	E. B. Reynolds
D. W. Wear	Geo. Thompson	W. F. Ackerman

DROPPED.

P. T. Lonergan
W. R. Elden
A. A. Graham
W. F. O'Hara
W. H. Judson

H. H. Newson
J. E. Dickson
C. A. Strom
H. S. Shields
S. J. Robinson

A. M. Stephenson
A. A. Kellogg
C. H. Doeblcr
Ward Wright
C. J. Hosmer
C. J. McDuffie

DEAD.

C. King
C. H. Dole

O. J. Bamford
A. Canvins

Jas. Mylett
G. W. West

The following is a list of new members during the year:—

Name	Address	Proposed by
Allen, G. F., Ry. Materials Co., Chicago.....		T. B. Cram
Anderson, W., A. G. M., Osterman Mfg. Co., Chicago.....		W. M. Drennan
Anderson, A. W., Chief Loco. Insp., C. B. & Q. Ry., Chicago..		E. C. Andrews
Austin, L. L., Gen. Claim Agt., N. W. Elev. R. R., Chicago..		J. L. Berman
Arter, W. D., Appr. L. S. & M. S. Ry., Euclid, Ohio.....		P. C. Cody
Bauer, J. H., R. H. F., Norfolk & Western Ry., Williamson, W. Va.		D. G. Cunningham
Blume, F. W., Scully Steel Iron Co., Chicago.....		W. H. Dangel
Bogart, P. B., American Fdy. & Furnace Co., Milwaukee, Wis.		J. W. Taylor
Bowes, C. F., Mgr., Lukenheimer Co., Chicago.....		E. W. Tetlow
Baker, A. F., Car For., Chicago So. Ry., Crete, Ill.....		J. J. Curtis
Bacon, C. G., Jr., Wheel Engr., Carnegie Steel Co., Pitts- burgh, Pa.		J. W. Taylor
Bryant, R. J., J. T. Ryerson & Son, Chicago.....		L. P. Michael
Benson, R. W., M. E., Pullman Co., Chicago.....		C. A. Seley
Byers, J. J., National Mall. Cast. Co., Chicago.....		J. P. Callahan
Bigelow, D. N., National Dump Car Co., Chicago.....		F. C. Cameron
Bramer, Henry, R. H. F., C. I. & S. Ry., Gibson, Ind.....		A. B. Fromm
Brydon, H. B., Sargent & Lundy, Chicago.....		J. N. Hatch
Brooks, C. A., Mach Insp., U. P. R. R., Hillburn, N. Y.....		W. S. Strong
Broster, M. B., Repr., U. S. Metal Pkg. Co., Chicago.....		A. J. Cota
Burry, G. J., Gen. Mgr., Pac. Ry., Winnipeg, Man.....		J. W. Taylor
Bridge, Arthur, Insp. Matls., C. B. & Q. Ry., Aurora, Ill..		G. H. Hill
Ball, John, A. P. A., C. & N. W. Ry., Chicago.....		G. C. Davidson
Black, W. G., M. M., N. Y. & St. L. Ry., Stony Island, Ill..		J. W. Taylor
Benedict, J. L., Cons. Supply Co., Chicago.....		L. A. Hopkins
Crane, L. W., Republic Steel & Iron Co., Chicago.....		W. O. Duntley
Cummings, J. P., Supt., C. B. & Q. Ry., Kansas City, Mo..		M. K. Barnum
Connors, J. C., Ralston Steel Car Co., Chicago.....		Warren Edwards
Connolly, W. L., Supt. Tel., C. I. & S. R. R., Gibson, Ind..		T. H. Goodnow
Comlossy, H., National Tube Co., Chicago.....		H. T. Bentley
Converse, W. A., Sec'y, Dearborn Drug & Chemical Co., Chicago		G. R. Carr
Carney, J. P., C. F., Mich. Cent. R. R., Chicago.....		C. H. Johnson
Covert, M. F., A. M. C. B., Swift Refr. Car Line, Chicago..		E. E. Jett
Coutts, R. V., Spec. Appr., U. P. Ry., Kansas City, Kas...		C. W. Clements
Canfield, L. T., Ass'n of Mfr's of Chilled Car Wheels, Chicago		J. W. Taylor
Cartmill, L. E., G. F., Pacific Fruit Express, Los Angeles, Cal.		L. L. Yates
Cressler, A. D., Prest., Kerr-Murray Mfg. Co., Ft. Wayne, Ind.		W. S. Morris

Name	Address	Proposed by
Doran, H. G., Commercial Acetylene Co., Chicago.....		M. Moskowit
Dunn, S. O., Ed. Mgr., Railroad Age-Gazette, Chicago.....		C. H. Fry, Jr.
Dembar, Thos., Mgr., Pullman Car Works, Pullman, Ill.....		C. W. Pflager
Duclos, A. E., Sales Mgr., Massachusetts Chemical Co., Chicago		E. F. Smith
Dyer, Chas., 2nd V. P., Rodger Ballast Car Co., Chicago...		J. O. Neikirk
Dolan, Thos., L. F. P. D., Balt. & Ohio R. R., Chicago.....		D. R. Mackenzie
Denny, S. F., Revere Rubber Co., Chicago.....		G. M. Crownover
Dickinson, O. L., Spec. Insp. of Trans., C. B. & Q. Ry., Chicago		M. K. Barnum
Davidson, C., Supt. Ryan Co., Hegewisch, Ill.....		H. Barnard
Dixon, L. L., Asst. Supt. Air Brakes, L. S. & M. S. Ry., Elkhart, Ind.		A. M. Bickel
Darling, P., G. M. E., Manning, Maxwell & Moore, New York		W. O. Jacquite
Doidge, B. H., Supt. Trans., Guanica Central R. R., En- senada, Porto Rico		J. P. Callahan
Eiler, John, Blue Island Car & Equipment Co., Chicago....		C. H. True
Englebright, H., M. C. R., So. Pac. Co., W. Oakland, Cal....		E. A. Gilbert
Endicott, G. F., National Dump Car Co., Chicago.....		H. A. Bowen
Ewing, C. J., Iowa Cent. Ry., Hammond, Ind.....		J. W. Taylor
Elliott, Vernon, Steno. to M. M., C. & W. I. Ry., Chicago...		C. A. Barnes
Etten, L., Illinois No. Ry., Chicago.....		M. J. Kelley
Enright, J. F., S. M., I. & G. N. Ry., Palestine, Tex.....		J. W. Taylor
Foyle, Chas., M. M., Susqa. & New York R. R., Towanda. Pa.		J. W. Taylor
Finnell, H. W., Chgo. Ry. Equipment Co., Chicago.....		E. F. Leigh
Fitzpatrick, F. R., Spec. Appr., Penna. Lines, Ft. Wayne, Ind		W. A. Jones
Friday, C. B., Salesman, Cornegie Steel Co., Chicago.....		J. W. Taylor
Forbes, R. C., Browning Engineering Co., Chicago.....		J. W. Taylor
Flory, B. P., S. M. P., N. Y. O. & W. Ry., Middletown, N. Y..		J. W. Taylor
Faut, D. A., M. M., Chicago City Ry., Chicago.....		J. W. Taylor
Garber, R. E., Standard Steel Car Co., Hammond, Ind....		A. Schneider
Gould, E. F., Elec. Engr., A. E. & C. Ry., Wheaton, Ill....		Jas. Lyman
Gardner, Edgar, Ward Packer Supply Co., Chicago.....		C. L. Buckingham
Gunn, F. M., Asst. to Mgr., Pullman Car Wks., Pullman, Ill.		W. Wright
Gaines, F. F., S. M. P., Cent. of Georgia Ry., Savannah, Ga..		J. W. Taylor
Goodspeed, C. B., Repr., Buckeye Steel Cast. Co., Chicago...		F. L. Cooledge
Gilman, G. H., M. C. B., Nor. Pac. Ry., St. Paul, Minn.....		J. G. Bower
Harriman, N. F., Engr. Tests, Union Pac. Ry., Omaha, Nebr.		J. W. Taylor
Holcomb, W. H., P. A. office, C. M. & St. P. Ry., Chicago...		J. W. Taylor
Hosceit, W. J., National Dump Car Co., Chicago.....		T. M. Snead
Harscha, B. R., Rodger Ballast Car Co., Chicago.....		T. M. Snead
Hurlbut, J. H., Draftsman, C. R. I. & P. Ry., Chicago.....		G. S. Goodwin
Hays, H. B., Gen. Shop For., C. B. & Q. Ry., Plattsmouth, Nebr		Wm. Baird
Hall, Grant, S. M. P., Can. Pac. Ry., Winnipeg, Man.....		J. W. Taylor
Havron, Jno., V. P. Latrobe Steel & Coupler Co., Chicago...		J. G. Robinson
Howard, H. W., Davenport Loco. Wks., Rock Island, Ill....		W. Chadwick
Hermansader, E. Z., R. H. F., C. M. & St. P. Ry., Chan- ning, Mich		A. E. Manchester
Hine, Major Chas., Railway Examiner, Vienna, Va.....		W. E. Symons
Haney, W. J., Asst. Agt., C. & E. I. R. R., Dalton, Ill.....		A. A. Bowman
Hardy, J. W., Fuel Agt., R. I. System, Chicago.....		Wm. Miller
Hall, Grant, S. M. P., Can. Pac. Ry., Winnipeg, Man.....		J. W. Taylor
Hinckley, A. C., M. M., C. H. & D. Ry., Lima, O.....		J. W. Taylor
Hale, Arthur, American Ry. Ass'n, Chicago.....		J. W. Taylor

Name	Address	Proposed by
Johnson, W. W., G. M., Standard Magnesia Co., Franklin, Pa		W. E. Symons
Johnson, J. W., Pyle Natl. Elec. H. L. Co., Chicago		A. G. Delaney
Johnson, F. L., Supt., C. B. & Q. Ry., Chicago		A. J. Cota
Kelley, R. G., Spec. App., L. S. & M. S. Ry., Collinwood, Ohio		R. B. Kendig
Kellogg, H. F., M. E., C. N. Y. & B. Rfg. Co., Chicago		G. T. Anderson
Keleher, J. J., Dist. For., U. P. R. R., Council Bluffs, Ia		G. H. Likert
Kerr, H. H., Westinghouse, Church, Kerr & Co., Chicago		M. K. Barnum
Krohn, A. S., Loco. Engr., L. S. & M. S. Ry., Chicago		J. T. Flavin
Kendall, A. L., W. P. Taylor Co., New York City		J. W. Taylor
Keckefoth, F. J., Mach. For., C. & N. W. Ry., Winona, Minn.		G. C. Bingham
Lynch, W. J., P. M., N. Y. C. Lines, Chicago		G. H. Bryant
Libby, J. E., M. C. B., Swift Refr. Car Line, Chicago		E. E. Jett
Layden, T. E., Asst. Engr. Tests, A. T. & S. F. Ry., Topeka, Kas		J. D. Pickard
Markel, Chas., Foreman, C. & N. W. Ry., Clinton, Ia		F. G. Benjamin
Miller, Wm., V. P. Adreon Mfg. Co., Chicago		F. L. Gordon
Mann, J. F., G. C. F., P. M. R. A., Saginaw, Mich		Jno. Troy
McCormick, A., Supt., Hicks Loco. & Car Wks., Chicago Heights, Ill		M. S. Monroe
Mirtz, P. P., C. D., L. S. & M. S. Ry., Elkhart, Ind		C. A. Towsley
Moore, A. C., Safety Car Htg. & Ltg. Co., Chicago		L. R. Pomeroy
Molyneaux, H. H., C. L. S. & E. Ry., Chicago		J. P. Callahan
Mercur, H. T., Ry. Materials Co., Chicago		T. B. Cram
Marsh, H. W., Trav. M. M., C. G. W. Ry., Chicago		F. C. Fodick
Maxwell, H. F., Insp., C. & N. W. Ry., Chicago		C. H. Osborn
Madson, S., C. F., C. G. W. Ry., Oak Park, Ill		H. W. Ensign
Milligan, H. A., T. M., C. I. St. E. Ry., Gary, Ind		J. Callahan
Mehan, J. E., Asst. to M. C. B., C. M. & St. P. Ry., Milwaukee, Wis		J. J. Hennessey
Miller, E. A., S. M. P., N. Y. C. & St. L., Cleveland, O		T. A. Lames
Mull, N. H., Spec. Appr., C. B. & Q. Ry., Aurora, Ill		G. H. Hill
Meaden, J. A., G. M., Paul Dickinson, Inc., Chicago		E. W. Hodgkins
Neeley, B. T., Jenkins Bros., Chicago		J. W. Taylor
Niles, W. E., Secy., Ontario Nor. & Mich. Ry., Chicago		W. E. Symons
Newhall, H. L., Repr., G. M. Newhall Eng. Co., Chicago		J. L. White
O'Leary, J. W., A. J. O'Leary & Son, Chicago		J. W. Taylor
Oakey, G. F., Pass. For., C. & A. R. R., Chicago		Geo. Kleifges
Owens, C. B., West. Sales Agt., Youngstown Car Mfg., Chicago		J. E. Simons
Paulson, W. B., Buda Fdg. & Mach. Co., Chicago		J. W. Taylor
Parsons, Otis, Atlantic Equipment Co., Chicago		J. H. Wynne
Passino, A. J., Secy. Brady Brass Co., Jersey City, N. J.		D. M. Brady
Pilliod, F. E., The Pilliod Co., Swanton, O		M. Marea
Pilliod, H., The Pilliod Co., Chicago		M. Marea
Pickard, J. D., Asst. to Engr. Tests, A. T. & S. F. Ry., Topeka, Kas		W. L. Allison
Philipp, E. L., Prest. Union Refr. Trans. Co., Milwaukee		J. J. Hennessey
Polley, C. H., C. C., Osterman Mfg. Co., Chicago		W. M. Drennan
Ponic, J. L., care J. B. Clow & Son, Chicago		A. J. Odegard
Poole, A. J., G. M. M., S. A. L. Ry., Portsmouth, Va		J. W. Taylor
Quinnell, H. J., Foreman, Ill. Cent. R. R., Chicago		J. M. Borrowdale
Ryder, G. E., Asst. Smoke Insp. Health Dept., Chicago		J. W. Taylor
Ryder, C. F., G. F., A. T. & S. F. Ry., Prescott, Ariz		E. De Silva
Rehm, N. F., Editor, Ry., Master Mechanic, Chicago		B. V. Crandall
Ryan, Jas., Engr., C. & W. I. R. R., Chicago		J. T. Bronson

Name	Address	Proposed by
Ricketson, W. E., Spec. Appr., L. S. & M. S. Ry., Elkhart, Ind.		A. R. Ayers
Reisman, H. E., Ed., R. I. Employes Magazine, Chicago.....		J. F. Maher
Ryan, Harry, Engr., C. & N. R. R., Chicago.....		J. T. Bronson
Rehmyer, O. H., R. F. E., C. R. I. & P. Ry., Blue Island, Ill..		M. K. Barnum
Russell, E. H., Mech. Dept., Penna. R. R., Chicago.....		W. G. Wilcoxson
Swan, C. J., R. H. F., C. M. & St. P. Ry., Ladd, Ill.....		H. E. Davis
Steinke, Edw., Pur. Dept., C. B. & Q. Ry., Chicago.....		P. Hunter
Stubbs, J. H., G. F., K. C. S. Ry., Pittsburg, Kas.....		M. K. Barnum
Shaw, H. P., Sales Agt., American Steel Works, Chicago...		J. T. Maher
Simmonds, R. P., Green-Tweed & Co., Chicago.....		J. W. Taylor
Strong, W. S., National Dump Car Co., Terre Haute, Ind...		H. A. Bowen
Sweaver, H. L., Jas. B. Sipe & Co., Chicago.....		T. D. Henderson
Seyfarth, E. E., C. C. to M. M., C. & W. I. Ry., Blue Island, Ill.		C. A. Barnes
Schaboni, M. J., Eng. Dept., C. & W. I. Ry., Chicago.....		C. A. Barnes
Schuck, Chas., Supt. Car Shops, Chicago Ry. Co., Chicago..		Z. Z. Murphy
Seeley, J. S., Nathan Mfg. Co., Chicago.....		Sanford Keeler
Sylvester, F. L., Asst. C. C., C. & E. I. R. R., Chicago.....		A. A. Bowman
Schunamann, Carl, Pur. Dept., C. & N. W. Ry.....		J. L. White
Stendwell, C. W., Gen. Supt., Nor. & Mich. Ry., Chicago...		W. E. Symons
Schultz, A. E., Foreman, Armour Car Lines, Chicago.....		A. B. Chadwick
Symons, G. E., Ralston Steel Car Co., Chicago.....		J. L. Connors
Seabrook, B. R., Western Engineering Co., Los Angeles, Cal.		J. W. Taylor
Sewing, Herman, Gang. For., C. B. & Q. Ry., W. Burlington, Iowa		J. A. Carney
Smith, R. E., G. S. M. R., A. C. L. R. R., Wilmington, N. C...		J. W. Taylor
Swayze, H. D., G. S. & P. A., K. L. S. & C. Ry., Kalamazoo, Mich.		A. C. Woods
Talcott, W., Railway Supplies, Rockford, Ill.....		C. A. Seley
Totten, A. I., Power & Mining Dept., Gen Elec. Co., Schenectady, N. Y.....		C. A. Seley
Trielaff, O. G., T. E., Ill. Cent. R. R., Chicago.....		N. R. Maus
Tawse, R., S. M. P., D. T. & I. Ry., Toledo, O.....		J. W. Taylor
Vial, F. K., Griffin Wheel Co., La Grange, Ill.....		J. W. Taylor
Van Dorn, W. T., W. T. Van Dorn Co., Chicago.....		T. L. Dodd
Williams, C. H., Jr., Chgo. Ry. Equipment Co., Chicago....		E. F. Leigh
Watkins, H. W., M. C. R., Southern Pac. Co., Los Angeles, Cal.		E. A. Gilbert
Woods, A. C., Union Spring & Mfg. Co., Chicago.....		B. H. Jeffries
Wilcox, E. M., G. F., C. I. & S. R. R., Gibson, Md.....		T. H. Goodnow
Wolfe, Chas., G. F. Morris & Co., Chicago.....		E. E. Tett
White, J. L., Prest. office, Wabash R. R., Chicago.....		J. W. Taylor
Whittingham, W. F., Insp., C. & N. W. Ry., Chicago.....		C. A. Schroyer
Wendt, P. W., Steel Car Forge Co., Chicago.....		W. A. Libkemon
Wright, A. B., R. F. E., C. I. & S. Ry., Gibson, Ind.....		A. B. Fromm
Waghoph, Chas., Chief Interchange Inspector, E. St. Louis, Ill.		P. D. Galarneau
Wilson, W. H., S. M. P., B. R. & P. Ry., Du Bois, Pa.....		J. W. Taylor
Wilson, L. F., Editor Ry. Master Mechanic, Chicago.....		J. W. Taylor
Waldron, H. H., Scully Steel & Iron Co., Chicago.....		F. D. Graves
Winks, L. H., Car For., C. & N. W. Ry., Chicago.....		C. H. Osborn
Yates, L. L., Supt. Repair Dept., Pacific Fruit Express, Los Angeles, Cal.....		E. A. Gilbert
Yilson, A. T., M. C. R., So. Pac. Co., Sacramento, Cal.....		E. A. Gilbert
Zuit, R. P., Republic Steel & Iron Co., Chicago.....		Tom Plunkett

The bills receivable are as follows:

From advertising.....	\$1,446.25
From annual dues—\$6.00.....	402.00
From annual dues—\$4.00.....	400.00
From annual dues—\$2.00.....	392.00
From sale of proceedings.....	50.00
	\$2,690.25

The assets of the club, in so far as available funds are concerned, can be estimated about as follows:

From advertising.....	\$1,446.25
From payment of dues, 25 per cent off.....	895.50
Unappropriated balance.....	694.40
Total available assets.....	\$3,036.15

FINANCIAL.

The treasurer's books show the following receipts and expenses:

RECEIPTS.

Balance on hand May 29, 1908.....	\$1,917.58
Receipts from all sources.....	4,791.18
Total receipts	\$6,708.76

EXPENSES.

Binding annual proceedings.....	\$ 596.17
Cost of advertisements.....	534.34
Library:—	
Salary Librarian.....	\$540.00
Insurance	7.80
Rent, library room.....	381.00
Incidentals	96.75
Office expenses	1,025.55
Postage	407.33
Printing	490.03
Printing	2,091.25
Reporting proceedings	226.93
Salary Secretary	300.00
Total expenses	\$5,671.60
Balance on hand.....	\$1,037.16

The increase in library expenses was incurred by the employment of a Librarian to index the volumes in the library, which required eight months; also, by the purchase of additional cabinets wherein to keep the books received.

The only indebtedness the club has is shown by the bills approved by the Board of Directors today, amounting to \$352.90.

Respectively submitted,

Jos. W. Taylor, Secretary.

THE SECRETARY: I have the report of the Treasurer.

TREASURER'S REPORT.

To the Officers and Members of the Western Railway Club:

I have the honor to present to you my eleventh annual statement:

Receipts.		Paid Out.	
Cash on hand May, 1908....	\$1,917.58		
Received from Secretary, 1908.		1908.	
August 11.....	658.50	May	\$ 940.45
August 24.....	583.25	June	60.00
September 15.....	525.50	July	60.00
October 20.....	318.00	August	60.00
November 17.....	182.00	September	1,316.32
December 16.....	297.75	October	390.80
1909.		November	397.95
January 19.....	633.55	December	440.61
February 16.....	291.67	1909.	
March 16.....	799.96	January	603.32
April 20.....	431.00	February	358.22
May 18.....	70.00	March	532.71
		April	511.22
Total	\$6,708.76		\$5,671.60
Paid out.....	5,671.60		
Cash on hand May, 1909.....			\$1,037.16

Respectively submitted,

P. H. Peck, Treasurer.

THE SECRETARY: Mr. Chairman, it is customary that these reports be received and referred to an auditing committee which shall be appointed by the Board of Directors to be elected this evening.

THE CHAIRMAN: You have heard the reading of the report of the Secretary and Treasurer; a motion to receive these reports and refer them to the proper committee will be in order at this time.

MR. A. E. MANCHESTER (C., M. & St. P. Ry.): I make that motion, Mr. Chairman.

Motion seconded.

THE CHAIRMAN: All in favor of the motion signify by saying "aye." Contrary, "no." Motion carried.

THE SECRETARY: In regard to the report of the Library, Mr. Seley, chairman of that committee, was called to New York and was unable to complete the report. That will be continued and printed in the proceedings of this meeting. They are not ready to make a complete report tonight.

THE CHAIRMAN: That disposes of the program down to the election of officers. This is our Annual Meeting, and we all regret that our President Mr. Barnum could not be here this evening. I am going to call upon one of the past presidents, Mr. H. T. Bentley, to preside during the election of officers. Mr. Bentley, will you kindly come up and preside?

(Mr. Bentley in the Chair.)

THE SECRETARY: Mr. Chairman, before we proceed with the elec-

tion of officers, I will read the provisions of the By-Laws in regard to the election of officers, which was done.

THE CHAIRMAN: Gentlemen, I will appoint as tellers Messrs. E. W. Pratt, J. E. Osmer, H. Vissering, E. S. Woods and C. H. Fry. Messrs. Pratt and Osmer to be counting tellers, the others collectors. Will you please prepare your ballot for President.

THE SECRETARY: I will read the list of officers at the present time. It might be of some assistance in your balloting.

The counting tellers reported result of ballot for President as follows: Total number of votes cast, 142. P. H. Peck, 1; C. B. Young, 1; J. F. DeVoy, 8; M. K. Barnum, 6; J. T. Flavin, 2; J. H. Goodnow, 4; W. E. Sharp, 120, the two highest on the list being W. E. Sharp and J. F. DeVoy.

MR. P. H. PECK (C. & W. I. R. R.): Move that the Secretary cast the unanimous ballot for Mr. Sharp.

Seconded by Mr. DeVoy.

THE CHAIRMAN: It has been moved and seconded that the Secretary cast the unanimous ballot of the Club for Mr. W. E. Sharp as president. All in favor signify by saying "aye." Contrary, "no."

Motion carried unanimously.

THE SECRETARY: Mr. Chairman, I cast the ballot of the Club for Mr. W. E. Sharp as president of the Western Railway Club for the ensuing year.

THE CHAIRMAN: Mr. W. E. Sharp is elected president unanimously. It is now in order to prepare your informal ballots for First Vice President.

The report of counting tellers on informal ballot for First Vice President was as follows: Total number of votes cast, 162. J. T. Flavin, 2; M. S. Monroe, 1; O. M. Foster, 4; George Hanauer, 1; E. E. Jett, 1; C. B. Young, 2; T. H. Goodnow, 13; J. F. DeVoy, 138.

MR. PECK: I move that the Secretary cast the ballot for Mr. DeVoy. (Seconded.)

THE CHAIRMAN: It is moved and seconded that the Secretary cast the unanimous vote for Mr. DeVoy for First Vice President. All in favor, make it known by saying "aye." Contrary "no."

Motion carried unanimously.

THE SECRETARY: I have the pleasure, Mr. Chairman, of casting the vote for Mr. J. F. DeVoy as First Vice President for the ensuing year.

THE CHAIRMAN: Mr. DeVoy has been unanimously elected as First Vice President. Now, we have a great deal of work yet to do; you will please prepare your ballots for Second Vice President as quickly as possible.

THE SECRETARY: I would like to say to the members that the following are the members of the Board of Directors: C. B. Young, George H. Bryant and T. H. Goodnow, Mr. Young being the senior member of the Board.

The report of the counting tellers on ballot for Second Vice President was as follows: Total number of votes cast, 146. William E. Alison, 2; Thos. Scott, 1; G. H. Bryant, 7; W. O. Moody, 14; C. B. Young, 82; T. H. Goodnow, 40.

MR. PECK: I make a motion that the Secretary cast the ballot for Mr. Young.

THE CHAIRMAN: You have heard Mr. Peck's motion, is it seconded?

Motion was seconded.

THE CHAIRMAN: It is moved and seconded that as Mr. Young has the majority of the total votes cast, the Secretary will cast a vote to make the election unanimous. All in favor say "aye." Contrary "no."

* Motion carried unanimously.

THE SECRETARY: Mr. Chairman, I cast the ballot of the Club for Mr. C. B. Young as Second Vice President for the ensuing year.

THE CHAIRMAN: Now we have a very difficult duty to perform, Gentlemen, and that is the annual election of Treasurer. You will please arrange to prepare an informal ballot for election of Treasurer, and do it quickly, please.

Gentlemen, to facilitate the movement of these things, while the ballot for Treasurer is being counted, will you please prepare your ballot for Directors? We require three, and the names of the six highest receiving the largest number of votes we will give a formal ballot for afterwards. Prepare your ballots now, please, for three directors.

THE SECRETARY: Each member is entitled to vote for three members of the Board of Directors.

MR. PECK: Who is on the present Board?

THE SECRETARY: Mr. Young you have elected Second Vice President, Mr. Goodnow and Mr. Bryant are the two remaining members. You will vote for three directors; don't vote for Mr. Young.

MR. PECK: I would suggest the name of Mr. LaRue, as there has not been a Rock Island man on the Board of Directors for some time.

THE CHAIRMAN: Is that in order?

MR. PECK: Well, I would just suggest it.

THE CHAIRMAN: Please prepare your ballots as soon as you can.

The report of the counting tellers on ballot for Treasurer was as follows: Thos. Scott, 2; W. O. Moody, 2; T. H. Goodnow, 2; W. J. Tollerton, 1; A. H. Lucas, 1; Peter H. Peck, 150.

It was moved and seconded that the Secretary be instructed to cast the ballot for Mr. Peck.

THE CHAIRMAN: All in favor of making the ballot unanimous, please say "aye." Contrary, "no."

Motion carried unanimously.

THE SECRETARY: Mr. Chairman, I cast the ballot of the Club for Mr. P. H. Peck for Treasurer for the ensuing year.

THE CHAIRMAN: Mr. Peck has been duly elected. Now, gentlemen, if you will please hurry in preparing your ballots for Directors. We still have some balloting to do. Will you prepare your ballot for Trustees of the Library; it will help matters. The Trustees now are: C. A. Seley, W. F. Sargent and Wm. F. M. Goss, who are eligible for re-election. Will you please prepare your ballots promptly?

The report of tellers on ballot for Board of Directors was as follows: Total number of individual votes cast, 365. Mr. Goodnow, 127; Mr. Bryant, 84; Mr. LaRue, 107; scattering, 47.

MR. PECK: I make a motion that the Secretary cast the ballot for the three highest. (Seconded.)

THE CHAIRMAN: It has been moved and seconded that the Secretary cast the ballot for the three highest. All in favor, please say "aye." Contrary, "no."

Carried unanimously.

THE SECRETARY: I cast the ballot for Messrs. Bryant, Goodnow and LaRue as members of the Board of Directors.

THE CHAIRMAN: Messrs. LaRue, Goodnow and Bryant are therefore elected directors of the Club. Have you all voted for Trustees of the Library?

The report of tellers for Library Trustees was as follows: Total number of individual ballots cast, 355; Sargent, 105; Seley, 116; Goss, 115; Davidson, 4; Odell, 1; scattering, 14.

THE CHAIRMAN: It has been moved and seconded that the Secretary cast the ballot, to make the election unanimous. All in favor, please say "aye." Contrary, "no."

Carried unanimously.

THE CHAIRMAN: The election of Messrs. Seley, Sargent and W. F. M. Goss has been made unanimous by the Secretary's vote. That closes the election of officers.

Gentlemen, I will appoint Mr. Carney as a committee to escort the President-elect to the chair.

Mr. President and Gentlemen, I am placed in a very embarrassing position tonight in having to take the chair in place of the retiring president, who unfortunately is absent from the city on business. I think we have all made a very wise choice in the selection of our new president, and I bespeak for you, gentlemen, the earnest co-operation with him in his duties.

Mr. Barnum, it appears, had to go out on the road, and very much regrets his absence here. It is unfortunate that he could not be on hand; according to the program, Mr. George H. Bryant was to open the proceedings in the vocal line by singing a basso solo, but it appears that in talking to his wife about it, she got so mad that she would not allow him to do it, consequently, as you all have the Western Railway Club Hymnal, we will request the trio to sing "So Long Mary," to the retiring President, and ask every one to join heartily in the chorus.

TO THE RETIRING PRESIDENT.

(So Long, Mary.)

Chorus:—

So long Morgan, Morgan we will miss you so,
 So long Barnum, how we hate to see you go,
 You can now get busy with your chickens, when alone
 So long Barnum, don't forget to come back home.

(Mr. Sharp in the Chair.)

THE PRESIDENT: I am sure you do not expect any serious speech from me, with this program before you. I want to assure you of my sincere appreciation of the honor you have conferred upon me of being elected President of the Western Railway Club on its Twenty-fifth anniversary. If I were to undertake to uphold the standard of this Club alone, I should indeed feel very doubtful of my ability, but with such a worthy and capable Secretary as we have in Mr. Taylor, I shall try my very best indeed to forward and uphold the standards of this Club during the coming year. I thank you again, Gentlemen.

THE SECRETARY: Mr. J. M. Hopkins was to sing a tenor solo, but he got cold feet and went to Philadelphia this afternoon, so the trio will have to lead us in paying our respects to Mr. Sharp.

TO THE PRESIDENT ELECT.

(Illinois.)

Chorus:—

When Armour's working day is o'er, William E., William E.,
 Through the city's verdant bower, William E., William E.,
 Comes Bubbly Creek's fragrant breeze, killing shrubbery and trees,
 Full of sickness and disease, William E., William E.,
 Won't you cuss it, cure or kill it, William E.

THE PRESIDENT: Gentlemen, I will appoint Mr. E. W. Pratt as a committee of one to escort our worthy First Vice President, Mr. DeVoy to the platform. Gentlemen, it gives me great pleasure to present to you our worthy First Vice President, Mr. DeVoy. Applause.

MR. DE VOY: Well, you all know me, anyway. I was looking at this "Budweiser" business, and it recalled to me an invitation I gave to the Treasurer four years ago, when I read a paper before this Club and he was finding some fault with the remarks I made; I invited him to Milwaukee and told him I would fill him full of Milwaukee's best if he came up to see me. He has never accepted that invitation, and I am now going to extend it to all of you, except church members. I will guarantee that I can give you something better than Budweiser, and you can all travel on the train, too. I thought you were going to sing this song.

Now, seriously, gentlemen, I want to say that I appreciate more than I can say—and I can say some too, at that—the honor that you have done me in making me your vice president. Any man that stands up here and looks at this good looking bunch, must appreciate the

honor there is in being elected vice president, because I think it is about the best bunch I have ever seen among railroad men, either for or against, and I want to thank every one of you for electing me to this office. I do not know whether the president wants a scrap with me or not, or what his idea was in getting me next to him, but I assure you I am not going to do much. You have all heard me talk enough, and I am not going to bore you any more, because there's a whole lot coming.

Once more, gentlemen, I want to thank you honestly, I want to thank you for your kindness and courtesy you have done me tonight in electing me first vice president, and I will try to do the best I can, whatever that is.

THE SECRETARY: Charley Jenks promised to sing this song. I do not know whether you want to hear him sing it or not.

(Calls for Mr. Jenks.)

THE PRESIDENT: I will appoint Mr. Squires as a committee to bring Mr. Jenks up to lead in the singing.

TO THE FIRST VICE PRESIDENT ELECT.

(Budweiser.)

Chorus:—

Jim DeVoy is a friend of mine,
 Friend of mine, yes, a friend of mine,
 What care we when our Jim's in line,
 For we've got Jim-mie—
 That's the reason we feel so fine
 Feel so fine, yes, we feel so fine,
 While Jimmy's a Frenchman, he comes from
 Milwaukee,
 So!!! Jimmy's a friend of mine.

THE PRESIDENT: Is Mr. Young, our second Vice President in the room? I believe Mr. Young is not here.

THE SECRETARY: Mr. Young, the Second Vice President is not here. Neither is Mr. Garrett to whom was assigned the part of singing this lyric yodle pathethique. I understand he was seen this morning with his grip in hand, headed for Texas. I would therefore suggest that the trio lead, and that we all join in singing the chorus with our compliments to Mr. Young.

TO THE SECOND VICE PRESIDENT ELECT.

(Honey Boy.)

Chorus:—

Charlie dear, we're glad you are advancing,
 How your friends must joyfully be dancing,
 To tell that you will soon be president,
 Charlie dear, Charlie dear.
 And if ever you should take a notion
 To go sailing 'way across the ocean,
 Charlie dear, never fear.
 We'll be waiting, waiting,
 Waiting for you, Charlie dear.

THE PRESIDENT: It becomes the sad duty of the President to introduce one of the new and younger members of this body. I want to appoint Mr. A. E. Manchester and Mr. Cota to escort our newly elected Treasurer to the platform.

MR. DE VOY: The President has imposed upon me a duty that I do not know how to perform; it is the first time in my life, but I recommend the gentleman as one who will stand without hitching. You won't have to be afraid as to what he will do, but really, gentlemen, I take great pleasure in introducing Mr. P. H. Peck, the treasurer elect.

MR. PECK: I feel a little off here with this crowd. Being behind this table and standing close to Mr. De Voy reminds me of a story I heard the other evening of a fellow in the penitentiary at Joliet; a Salvation Army man came around talking to the prisoners, and finally stopped in front of the cell of this particular prisoner. After talking awhile the visitor took a bible out of his pocket and began reading to the prisoner. After reading for some little time the prisoner stopped him and requested him to read it again. So he read it again and again at the suggestion of the prisoner. Finally he asked him what part of the reading made the impression on his mind, or was of so much interest to him, and the answer was, "I don't care a d— about what you've been reading, but I haven't had a drink in six months, and your breath makes me feel good." Laughter.

THE SECRETARY: The next song on the program is a quartette by Messrs. Carney, Parish, Goss and Forsyth, all Past Presidents. I notice Messrs. Carney and Forsyth in the audience; perhaps the Club would like to hear them sing this song as a duet.

MR. CARNEY: I do not believe the Western Railway Club wants fifty per cent of anything. I would therefore suggest that the trio lead, as usual.

TO THE TREASURER ELECT.

(Everybody Works but Father.)

Chorus:—

Everybody works but Peter; he sits round all day,
Taking our hard earned money, soon as we've had our pay.
When it comes to telling stories, he always is on deck,
Everybody works in our Club, but P. H. Peck.

THE PRESIDENT: That finishes the installation of officers. We will proceed with the entertainment part of the program.

The full program is as follows:

PROGRAM

Roll Call.
 Approval of Record of Last Meeting
 Monthly Report of Secretary.
 Special Notices.
 Annual Report of Secretary.
 Annual Report of Treasurer.
 Annual Report of Library Trustees.
 Election of Officers.

INSTALLATION OF OFFICERS

Address of Retiring President

Basso Solo—Piano Accompaniment.....“So Long Mary”
 By Mr. George H. Bryant

Address of President-elect

Tenor Solo—(W) E Sharp.....“Illinois”
 By Mr. J. M. Hopkins

Address of First Vice-President-elect

Baritone Selection, Extraordinary.....“Budweiser”
 By Mr. Charlie Jenks

Address of Second Vice-President-elect

Lyric Yodle, Pathetique.....“Honey Boy”
 By Mr. M. A. Garrett

Remarks of Treasurer-elect

Quartette.....“Everybody Works But Father”
 First Tenor, J. A. Carney
 Second Tenor, Le Grande Parish
 First Basso, Prof. W. F. M. Goss
 Second Basso, Wm. Forsyth

Unavoidable circumstances prevented the procurement of music in time for rehearsal. Artists are requested to meet at 6:30 p. m. If you can sing, sing; if not, make a noise.

PROGRAM—Continued

ENTERTAINMENT

Some Fun.....Mr. Tom Corwine
Polyphonic Imitator
(Whatever that is)

He will rest your tired brain, and make your soul cleaner than the side of a box car since the rule against placing advertisements on cars went into effect.

Magique Mysterious.....Mr. H. K. McEvoy

It is a pleasure to introduce a "rara avis" whose artistic and refined line of "Magic" has entranced crowned heads, uncrowned heads, bald heads, bone heads, bolt heads, (rough and finished); brake heads, dead heads, etc., both in this country and abroad. He agrees to produce the remedy for the abuse of the repair card.

A-Yard-of-Talk.....Mr. Chas. W. Hitchcock

This club has produced a great many good speakers, but they pale into insignificance when compared with Hitchcock. If he misses a word, or slips an eccentric, he makes signs, and thus the flow of words, like the brook, goes on and on. Hearing is believing.

Some More Fun.....Mr. Tom Corwine

Tom says if joint evidence is presented, he will furnish defect cards for the damage done by his first offense, as per Arbitration Case No. 789.

A Few Minutes in Minstrelsy

The Harmony Dispensers.....Messrs. Hitchcock, Purdy and Kloer
Instrumental Music, Jokes, (assorted); Stories and Recitations, (dialects); Imitations and Parodies, (extemporaneous); Musical Dialogues, (humorous and pathetic); Songs, (new and old, mostly old); Bones, (any old kind); Whistling, etc., etc., etc.

Hooks will be furnished if these entertainers prove to be "bum amateurs."

"Breathes there a man with soul so dead,
Who never to himself hath said:
This is my own, my native land."

Closing Ode....."America"
By Everybody Present.

Between spasms a few cheroots will be furnished so the members can smoke themselves black in the face.

No luncheon or drinks will be served because it is thought no one could eat or drink after listening to the above program.

CONSTITUTION

ARTICLE I.

Name.

The name of this association shall be the Western Railway Club.

ARTICLE II.

Objects.

The objects of this association shall be the advancement of knowledge relating to safe and economical railway operation, and to the construction, maintenance and service of railway machinery, motive power and rolling stock, by discussion in common, investigation and reports of the experience of its members; to provide an organization through which the members may help to bring about uniformity and interchangeability of the parts of railway cars, to improve their construction, and to adjust the mutual interests growing out of their interchange and repair.

ARTICLE III.

Membership.

This club shall consist of persons interested in railroad matters generally, who may be admitted by a majority of quorum vote of the executive committee and the payment of the annual assessment, and who shall receive copies of the proceedings issued in the current year prior to the date of admission to the club, provided the secretary has sufficient additional copies for this purpose.

ARTICLE IV.

Officers.

The officers of this club shall hold office for one year, to be elected at the annual meeting, and shall consist of:

1. A president, who shall preside at all meetings of the club and perform the duties pertaining to a presiding officer. He shall also be a member and chairman of the executive committee, shall approve of all bills before payment, and shall countersign all checks drawn by the treasurer on the funds of the club, said checks not being negotiable without his signature.

2. A vice-president, who shall, in the absence of the president, perform all duties required of that office.

3. A second vice-president, who shall, in the absence of both the president and vice-president, perform the duties of the office of president.

4. A secretary, who shall also be the secretary of the executive committee and a member of that committee. The secretary shall be appointed by the executive committee, and shall keep the minutes of all meetings, have charge of the publication of the club proceedings, and perform other routine work pertaining to the business affairs of the club, under the direction of the executive committee.

5. A treasurer, who shall have charge of all funds, and pay all bills when audited by the executive committee and approved by the president, and who shall submit at each regular meeting of the executive committee an

exact statement of his accounts and the condition of the funds of the club, and shall make an annual report to the club at the end of the year, and such reports during the year of the condition of the funds of the club as may be required.

6. The executive committee shall consist of six members, including the officers of the club and a sixth member of the committee, who shall be elected by the club. The executive committee shall arrange programmes for meetings and have general supervision over the interests of the club, and shall audit all bills before payment and audit the books of the secretary and treasurer at each regular meeting.

Election.

7. Election shall be had by informal written ballot for nominations, to be followed by a formal written ballot for election. Only the two candidates receiving the highest number of votes in the informal ballot shall be voted upon in the formal ballot.

ARTICLE V.

Amendments.

This constitution may be amended at any regular meeting of the club by a three-fourths vote of the members present and voting, said amendment having been proposed in writing at a previous regular meeting.

ARTICLE VI.

Discussion by Patentees.

No patentees or their agents, or agents for the sale of railway supplies shall occupy the attention of the meeting in the interests of devices in which they are personally or financially interested, unless they are especially invited to do so by a majority of the members present, or by consent of a majority of the executive committee, and then only when the article they represent forms a part of the subject for discussion at the regular meeting.

ARTICLE I.

Section 1. Meetings of the club shall be held on the third Tuesday of each month at 2 p. m., except in the months of June, July and August.

Sec. 2. The annual meeting shall be held on the third Tuesday in May of each year.

Sec. 3. The president, or a majority of the executive committee, may call special meetings at such times as he or they may deem expedient.

ARTICLE II.

At any regular meeting, five members shall constitute a quorum.

ARTICLE III.

The order of business shall be as follows:

1. Approval of minutes.
2. Announcement of new members and reception of applications for membership.
3. Unfinished business.
4. Reports of committees.
5. New business.
6. Discussion of paper read at previous meeting.
7. Recess.
8. Presentation of paper or report.
9. Appointment of committees. . .
10. Election of officers.
11. Announcement of subject for next meeting.
12. Adjournment.

ARTICLE IV.

Any person eligible under the constitution, and having been elected by the executive committee, becomes a member of the association by paying the annual dues. All members, whether railway employes or railway supply agents, shall have equal rights in all discussions, and in all business which properly comes before the meetings of the club, except as provided in Article VI of the Constitution.

ARTICLE V.

At the annual meeting, the names of those members whose assessments are unpaid for the year then ended, may be dropped from membership, and such persons shall not be eligible to further membership until all back dues are paid.

ARTICLE VI.

The executive committee is expected to provide papers or matter for discussion at each regular meeting; to have the same in print for distribution at the meeting, and to arrange for prompt publication of the proceedings.

ARTICLE VII.

The secretary will mail the printed proceedings to all members of this and other exchanging railroad clubs, and to the technical and other papers, not later than the second Saturday after the Tuesday of the meeting. The technical papers are requested not to make reports of the proceedings of the meeting, or of papers read before the club, except as presented in the printed proceedings.

ARTICLE VIII.

The stenographic report of the meeting will be confined to resolutions, motions, and discussions of papers, and all miscellaneous discussion of the affairs of the club or general business will not be reported by stenographer unless specially so instructed by the presiding officer, or by adopted motion of a member.

ARTICLE IX.

These by-laws may be amended at any regular meeting of the club by a vote of three-fourths of the members present and voting; such amendment having been proposed in writing at a previous regular meeting.

LIST OF MEMBERS

- A. C. Adams, M. M., N. Y. N. H. & H. East Hartford, Conn.
- A. W. Adams, Sales Mgr., Allen & Morrison Brake Shoe Co., Woman's Temple, Chicago, Ill.
- C. E. Adams, Draftsman, Ill. Cent. R. R., Chicago, Ill.
- J. J. Adams, 117 No. Scott Street, Sheridan, Wyoming.
- R. H. Aishton, Gen. Mgr., C. & N. W. Ry., Chicago, Ill.
- T. W. Aishton, 417 Fisher Bldg., Chicago.
- G. A. Akerlind, National Dump Car Co., Chicago, Ill.
- C. J. Albert, Mgr. Western Dept., Cleveland Pneumatic Tool Co., 704 Fisher Bldg., Chicago, Ill.
- F. L. Alcott, Foreman Test Room, C. M. & St. P. Ry., W. Milwaukee, Wis.
- Walter Alexander, A. D. M. M., C. M. & St. P. Ry., W. Milwaukee, Wis.
- G. F. Allen, Ry. Materials Co., Chicago, Ill.
- C. J. Allen, Box 528, Milwaukee, Wis.
- L. S. Allen, R. F. E., C. & N. W. Ry., Chicago.
- E. H. Allfree, Chief Draftsman, Locomotive Appliance Co., Chicago, Ill.
- W. L. Allison, M. E., A. T. & S. F. Ry., Chicago, Ill.
- R. C. Alsdorf, Central City, Colo.
- C. F. Ames, Great Nor. Bldg., Chicago.
- A. W. Anderson, Chief Loco. Insp., C. B. & Q. Ry. Chicago, Ill.
- Chris Anderson, G. C. F., C. R. I. & P. Ry., Chicago, Ill.
- C. M. Anderson, care C. B. & Q. Ry., Decorah, Ia.
- David Anderson, M. M., Chicago Union Traction Co., Clearing, Ill.
- E. C. Anderson, Draftsman, C. B. & Q. Ry., Chicago, Ill.
- Geo. T. Anderson, Supt. C. N. Y. & B. Ry., Elsdon, Ill.
- Gus Anderson, care C. M. & St. P. Ry., Perry, Ia.
- Olaf Anderson, Draftsman, C. & N. W. Ry., Chicago, Ill.
- W. Anderson, A. G. M., Osterman Mfg. Co., Chicago, Ill.
- W. W. Andrews, Gen. Supt., Northern Territories Ry., Port Darwin, Northern Territory of Australia.
- F. R. Angell, National Mall. Castings Co., Chicago, Ill.
- F. J. Angier, 979 No. Cedar St., Galesburg, Ill.
- J. B. Arbuthnot, Webb City, Mo.
- E. J. Arlein, Patton Paint Co., Chicago, Ill.
- B. J. Arnold, Borland Block, Chicago, Ill.
- W. C. Arp, S. M. P., Vandalia R. R., Terre Haute, Ind.
- W. D. Arter, Appr. L. S. & M. S. Ry., Euclid, O.
- A. J. Ashton, C. C. Supt. Tel., C. & E. I. R. R., Chicago, Ill.
- W. W. Atterbury, G. M., Penna. R. R., Philadelphia, Pa.
- C. B. Ault, Lawrenceville Bronze Co., Pittsburg, Pa.
- F. R. Austin, Auditor, E. & T. H. Ry., Evansville, Ind.
- L. L. Austin, Gen. Claim Agt., N. W. Elev. R. R., Chicago, Ill.
- T. G. Averill, Marvin Mfg. Co., Chicago, Ill.
- C. A. V. Axen, G. F., C. & N. W. Ry., Kaukauna, Wis.
- C. F. W. Axen, Foreman Mach., Ill. Cent. R. R., Kankakee, Wis.
- G. F. Axtell, Pittsburg, Pa.
- A. R. Ayers, Supt. Shops, L. S. & M. S. Ry., Elkhart, Ind.
- C. G. Bacon, Jr., Wheel Engr., Carnegie Steel Co., Pittsburg, Pa.
- C. M. Bailey, R. F. E., C. B. & Q. Ry., McCook, Neb.
- Geo. H. Baird, Asst. to Gen. Mgr., Pullman Co., Chicago, Ill.
- Wm. Baird, G. C. I., C. B. & Q. Ry., Platts-mouth, Neb.
- A. F. Baker, Car For., Chicago So. Ry., Crete, Ill.
- C. M. Baker, Murphy Varnish Co., Chicago, Ill.
- F. L. Baker, 15332 Vine Ave., Harvey, Ill.
- H. Baker, G. M., C. N. O. & T. P. Ry., Cincinnati, O.
- C. F. Balch, 1757 Columbia Road, Washington, D. C.
- J. W. Balderston, M. M., Colo. & Wyo. Ry., Sunrise, Wyo.
- J. A. Baldwin, Berlin Machine Works, Chicago, Ill.
- W. H. Baldwin, Adams & Westlake Co., Chicago, Ill.
- W. M. Baldwin, Galena Signal Oil Co., Chicago, Ill.
- A. L. Ball, R. H. F., C. I. & S. Ry., Kankakee, Ill.
- H. F. Ball, American Loco. Auto Co., New York City.
- John Ball, A. P. A., C. & N. W. Ry., Chicago, Ill.
- W. J. Ball, V. P., Standard Car Door Co., Chicago.
- John Bane, Loco. Engr., C. & N. W. Ry., Chicago, Ill.
- E. D. Bangs, Bangs Oil Cup Co., Milwaukee, Wis.
- D. C. Barbee, Prest., Standard Metal Mfg. Co., Chicago, Ill.
- J. C. Barber.
- J. C. Barber, Standard Car Truck Co., Chicago, Ill.
- L. W. Barber, Standard Car Truck Co., Chicago, Ill.
- Harry Barnhard, Draftsman, Armour Car Lines, Chicago, Ill.
- C. A. Barnes, Foreman, Belt R. R., Chicago, Ill.
- A. H. Barnhart, For., C. & N. W. Ry., Logan, Ia.
- M. K. Barnum, C. B. & Q. Ry., Chicago, Ill.
- J. H. Barrowdale, G. F. C. D., Ill. Cent. R. R., Chicago, Ill.
- J. J. Berry, Gen. Foreman, Norfolk & Western Ry., Roanoke, Va.
- L. L. Barth, V. P., Edw. Hines Lumber Co., Chicago, Ill.
- W. S. Bartholomew, Western Mgr., Westinghouse Air Brake Co., Chicago, Ill.
- T. F. Barton, E. Orange, N. J.

- F. Bakerfield, Mgr. West. Ry. Dept., Crucible Steel Co., Chicago, Ill.
 G. M. Basford, American Loco. Co., 30 Church St., New York City.
 Geo. D. Bassett, Crerar, Adams & Co., Austin, Ill.
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- J. J. Elliott, Secretary, Nashville Carbon & Oil Co., Chicago, Ill.
- P. M. Elliott, Camel Co., Chicago, Ill.
- Vernon Elliott, Steno. to M. M., C. & W. I. Ry., Chicago, Ill.
- C. E. Emerson, Care Foreman, A. T. & S. F. Ry., McCook, Neb.
- H. R. Emerson, 1522-32 Cortlandt St., New York City.
- G. F. Endicott, National Dump Car Co., Chicago, Ill.
- L. E. Endsley, Purdue University, Lafayette, Ind.
- H. Englebright, M. C. R., So. Pac. Co., W. Oakland, Cal.
- F. L. Englehart, Auditor, Cold Blast Transportation Co., Chicago, Ill.
- O. B. Englisch, V. P. Erie & Michigan Ry. & Navigation Co., Chicago, Ill.
- J. F. Enright, S. M., I. & G. N. Ry., Palestine, Texas.
- H. W. Ensign, Loco. Foreman, Chicago Great Western Ry., Chicago, Ill.
- J. E. Epler, 419 North Anglin St., Cleburne, Tex.
- W. D. Epler, Piece Work Inspr., C. B. & Q. Ry., Beardstown, Ill.
- Max Epstein, President, German-American Car Lines, Chicago, Ill.
- Thos. Erickson, G. F., C. & N. W. Ry., Huron, S. D.
- Robt. Erskine, M. M., C. & N. W. Ry., Oak Park, Ill.
- Evan Espeseth, C. C. to M. M., C. & N. W. Ry., Missouri Valley, Ia.
- H. H. Estrup, Car Foreman, Chicago & Eastern Illinois R. R., Chicago, Ill.
- L. Etten, Illinois No. Ry., Chicago, Ill.
- J. A. Euhmann, Engineer Dept., Indiana Steel Co., Chicago, Ill.
- D. J. Evans, The Rail Joint Co., Chicago, Ill.
- W. H. Evans, M. M., International Ry. Co., Buffalo, N. Y.
- W. P. Evans, Baldwin Locomotive Works, Portland, Oregon.
- C. J. Ewing, Iowa Cent. Ry., Hammond, Ind.
- W. F. Fantom, Foreman Boiler Shop, New York, Chicago & St. Louis Ry., Chicago, Ill.
- R. S. Faragher, Secretary, Blue Island Car & Equipment Co., Pullman, Ill.
- C. C. Farmer, Westinghouse Air Brake Co., Chicago, Ill.
- A. J. Farrelly, Electrician, C. & N. W. Ry., Chicago, Ill.
- D. A. Faut, M. M., Chicago City Ry., Chicago, Ill.
- J. M. Feldhake, Supt., South Side Elevated R. R., Chicago, Ill.
- F. D. Fenn, The Crane Co., Chicago, Ill.
- W. L. Fergus, C. G. Armstrong & Co., Chicago, Ill.
- M. R. Ferguson, The Crucible Steel Co., Chicago, Ill.
- M. J. Feron, Supt. Trains & Stations, Metropolitan West Side Elevated R. R., Chicago, Ill.
- Walter Ferris, Engineer, The Bucyrus Co., S. Milwaukee, Wis.
- Thos. Fildes, Gold Car Heating & Lighting Co., New York City.
- H. W. Finnell, Chgo. Ry. Equipment Co., Chicago, Ill.
- G. G. Fisher, Foreman Boiler Shop, Belt Ry., Chicago, Ill.
- O. A. Fisher, 4408 Indiana Ave., Chicago, Ill.
- Lawrence Fitch, Railway Steel Spring Co., Chicago, Ill.
- E. M. Fitz, Special Inspr., M. P. Pennsylvania R. R., Columbus, O.
- C. H. Fitzhugh, Fitzhugh & Co., Chicago, Ill.
- Jas. Fitzmorris, Chicago Junction Ry., Chicago, Ill.
- F. R. Fitzpatrick, Spec. Appr., Penna. Lines, Ft. Wayne, Ind.
- J. R. Flannery, Flannery Bolt Co., Pittsburg, Pa.
- J. T. Flavin, M. M., C. I. & S. Ry., Gibson, Ind.
- H. B. Fleming, C. E., Chicago City Railway Co., Chicago, Ill.
- B. P. Flory, S. M. P., N. Y. O. & W. Ry., Middletown, N. Y.
- H. A. Flynn, 380 So. Main St., Pittston, Pa.
- J. W. Fogg, M. M., Chicago Terminal Trans. Ry., E. Chicago, Ind.
- J. S. Ford, Auditor, Chicago & Eastern Illinois R. R., Chicago, Ill.

- R. C. Forbes, Browning Engineering Co., Chicago, Ill.
- A. Forsyth, M. M., C. B. & Q. Ry., Aurora, Ill.
- G. A. Forsyth, Forsyth Bros. Co., Chicago, Ill.
- J. E. Forsyth, Forsyth Auto. Air & Steam Coupler Co., Chicago, Ill.
- W. H. Forsyth, President, Forsyth Bros. Co., Chicago, Ill.
- Wm. Forsyth, "The Railway Age," Chicago, Ill.
- F. C. Fosdick, Asst. M. M., C. & N. W. Ry., Chicago, Ill.
- O. M. Foster, M. M., L. S. & M. S. Ry., Elkhart, Ind.
- W. G. Fox, 14 West 84th St., New York City.
- W. E. Fowler, 341 Kensington Ave., Westmount, Que.
- W. E. Fowler, Jr., Simplex Railway Appliance Co., Hammond, Ind.
- J. F. Foyer, Material Clerk, C. B. & Q. Ry., Omaha, Neb.
- Chas. Foyle, M. M., Southern Pac. Co., Winnemucca, Nev.
- C. E. Foyle, D. F., So. Pac. Ry., Winnemucca, Nevada.
- M. D. Franey, Supt. Shops, L. S. & M. S. Ry., Collinwood, O.
- Geo. B. Fravel, M. M., Pennsylvania Lines, Dennison, O.
- J. N. Fredendall, R. F. E., C. & N. W. Ry., So. Kaukauna, Wis.
- J. B. Freeman, German-American Portland Cement Works, Cleveland, O.
- C. H. Fresher, Franklin Mfg. Co., Chicago, Ill.
- N. Frey, M. M., C. B. & Q. Ry., La Crosse, Wis.
- H. O. Freytag, Machinist, C. B. & Q. Ry., W. Burlington, Ia.
- C. B. Friday, Salesman, Carnegie Steel Co., Chicago, Ill.
- W. F. Friedman, Storekeeper, Armour Car Lines, Chicago, Ill.
- Wm. Frier, General Foreman, C. B. & Q. Ry., Hannibal, Mo.
- T. J. Frier, Supply Agent, C. B. & Q. Ry., Chicago, Ill.
- A. J. Fries, Boston & Albany R. R., Springfield, Mass.
- Henry Fries, 1090 Old Colony Building, Chicago, Ill.
- W. F. Fries, S. C. D., Live Poultry Trans. Co., Chicago, Ill.
- A. B. Fromm, 177 State Line St., Hammond, Ind.
- H. W. Frost, 812 Penobscot Bldg., Detroit, Mich.
- C. H. Fry, Jr., Railroad Gazette, Chicago, Ill.
- W. C. Fry, Loco. Engr., C. & W. I. Ry., Chicago, Ill.
- Chas. Fuller, Asst. Foreman, C. M. & St. P. Ry., Milwaukee, Wis.
- C. E. Fuller, S. M. P., Union Pacific Ry., Omaha, Neb.
- Geo. Fuller, 1213 Fisher Bldg., Chicago, Ill.
- I. N. Funk, M. M., C. B. & Q. Ry., Ottumwa, Ia.
- F. W. Furry, Ohio Injector Co., Chicago, Ill.
- W. S. Furry, Ohio Injector Co., Chicago, Ill.
- F. F. Gaines, S. M. P., Cent. of Georgia Ry., Savannah, Ga.
- A. H. Gale, 145 13th St., Milwaukee, Wis.
- W. T. Gale, Foreman, C. & N. W. Ry., Chicago, Ill.
- P. D. Galarneau, Supt. Armour Car Lines, St. Clair Co., Ill.
- F. S. Gallagher, Gen. Offices, L. S. & M. S. Ry., Cleveland, O.
- T. M. Gallagher, Scullin-Gallagher Iron & Steel Co., St. Louis, Mo.
- R. E. Garber, Standard Steel Car Co., Hammond, Ind.
- Edgar Gardner, Ward Packer Supply Co., Chicago, Ill.
- D. E. Gardner, R. F. E., N. & W. Ry., Portsmouth, O.
- H. A. Gardner, Electrical Engineer, C. B. & Q. Ry., Chicago, Ill.
- H. W. Gardner, C. C., C. D., L. S. & M. S. Ry., Chicago, Ill.
- J. E. Gardner, Special Apprentice, C. B. & Q. Ry., Aurora, Ill.
- J. W. Gardner, Allis-Chalmers Co., Chicago, Ill.
- W. A. Gardner, G. M., C. & N. W. Ry., Chicago, Ill.
- T. H. Garland, G. A. R. S., C. B. & Q. Ry., Chicago, Ill.
- M. A. Garrett, 1713 Fisher Bldg., Chicago, Ill.
- W. H. Garrett, Mgr. Ry. Dept., Fairbanks, Morse & Co., Chicago, Ill.
- Wm. Garstang, S. M. P., C. C. C. & St. L. Ry., Indianapolis, Ind.
- Chas. Gasper, S. M. P., Yuch Haw Ry., Canton, China.
- Richard Gear, Apprentice, Armour Car Lines, Chicago, Ill.
- C. W. Gennett, Jr., R. W. Hunt & Co., Chicago, Ill.
- G. M. Germain, Loco. Engr., Chicago & Alton Ry., Bloomington, Ill.
- John German, Boiler Insp., L. S. & M. S. Ry., Kankakee, Ill.
- M. H. Gerry, Jr., Supt., Helena W. & E. P. Co., Helena, Mont.
- E. L. Gibbs, Inspector, Interstate Commerce Commission, Ft. Worth, Texas.
- Geo. Gibbs, V. P., Westinghouse, Church, Kerr & Co., New York City.
- J. A. Gibson, M. M., C. C. C. & St. L. Ry., Urbana, Ill.
- E. A. Gilbert, West. Repr., W. H. Miner Co., Chicago, Ill.
- F. M. Gilbert, M. E., N. Y. C. & H. R. R., G. C. Station, New York City.
- John Gill, S. M. P., C. I. & L. Ry., Lafayette, Ind.
- H. A. Gillis, Washington, D. C.
- E. D. Gilman, Freeman, L. S. & M. S. Ry., Toledo, O.
- G. H. Gilman, M. C. B., Nor. Pac. Ry., St. Paul, Minn.
- F. M. Gilmore, H. W. Johns-Manville Co., Chicago, Ill.
- G. G. Gilpin, Draftsman, C. B. & Q. Ry., Riverside, Ill.
- A. J. Gilson, M. C. R., Southern Pacific Co., Sacramento, Cal.
- Gustav Gironx, R. H. F., Canadian Pacific Ry., Montreal, Canada.
- J. S. Goddard, American Steel Foundries, Chicago, Ill.
- E. H. Gold, Railway Exchange Bldg., Chicago, Ill.
- F. M. Good, Loco. Engr., C. & W. I. Ry., Chicago, Ill.
- C. B. Goode, American Locomotive Co., Schenectady, N. Y.

- A. E. Goodhue, F. A. Lester Co., Chicago, Ill.
 C. A. Goodnow, Chicago & Alton Ry., Chicago, Ill.
 T. H. Goodnow, M. C. B., L. S. & M. S. Ry., Chicago, Ill.
 Geo. P. Goodrich, M. M., Ft. Smith & Western Ry., Fort Smith, Ark.
 C. B. Goodspeed, Repr., Buckeye Steel Cast. Co., Chicago, Ill.
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 L. E. Gould, Editor, Street Railway Review, Chicago, Ill.
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 J. A. Graham, F. C. R., Pennsylvania Lines, Ft. Wayne, Ind.
 J. A. Graham, Columbia, Tenn.
 S. C. Graham, M. M., C. & N. W. Ry., Kaukauna, Wis.
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 R. I. Graves, Special Apprentice, C. & N. W. Ry., Chicago, Ill.
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 H. J. Green, Chicago Varnish Co., Chicago, Ill.
 J. F. Green, Gen. Foreman, Wabash Ry., Chicago, Ill.
 R. E. Gribbens, Asst. Foreman, C. & W. I. R. R., Chicago, Ill.
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 T. A. Griffin, Prest-Griffin Wheel Co., Chicago, Ill.
 Geo. H. Grace, Supt. Tel., Ill. Cent. R. R., Chicago, Ill.
 Geo. Groobey, Buckeye Steel Castings Co., Atlanta, Ga.
 A. L. Guilford, Mgr. The Ajax Mfg. Co., Chicago, Ill.
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 R. E. Gurley, C. E., Otis Gas Engine Works, Chicago, Ill.
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 R. H. Hackney, Prest., Pressed Steel Tank Co., Milwaukee, Wis.
 Tsuto Hagio, Besshi Copper Mine, Niihama, Japan.
 F. W. Hahn, Rodger Ballast Car Co., Chicago, Ill.
 M. H. Haig, care M. P. Dept., A. T. & S. F. Ry., Topeka, Kan.
 John Hair, S. M. P., B. & O. S. W. R. R., Cincinnati, O.
 Arthur Hale, American Ry. Ass'n, Chicago, Ill.
 H. H. Hale, M. M., G. & S. I. R. R., Gulfport, Miss.
 E. M. Hall, Salesman, Atlantic Equipment Co., Chicago, Ill.
 Grant Hall, S. M. P., Can. Pac. Ry., Winnipeg Man.
 Jas. Hall, Southern Pacific Co., Sacramento, Cal.
 W. B. Hall, Mather Stock Car Co., Chicago, Ill.
 W. F. Hall, Special Apprentice, L. S. & M. S. Ry., Cleveland, O.
 B. F. Haller, Estherville, Ia.
 E. B. Halsey, Baldwin Locomotive Works, St. Louis, Mo.
 J. R. Hamilton, Draftsman, Armour Car Lines, So. Omaha, Neb.
 O. S. Hamilton, Chief Car Inspr., C. B. & Q. Ry., Aurora, Ill.
 W. H. Hammond, Consolidated Car Heating Co., Chicago, Ill.
 Geo. Hanour, Supt., Chicago, Indiana & Southern Ry., Chicago, Ill.
 W. J. Haney, Asst. Agt., C. & E. I. R. R., Dolton, Ill.
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 J. T. Harahan, Jr., Buda Fdy. & Machine Co., Chicago, Ill.
 A. T. Harden, Asst. to G. M., New York Central & Hudson River R. R., New York.
 J. W. Hardy, Fuel Agt., R. I. System, Chicago, Ill.
 F. L. Harkness, 315 Railway Exchange Bldg., Chicago, Ill.
 G. A. Harmon, Engr., C. M. & St. P. Ry., Milwaukee, Wis.
 W. S. Harpell, Salesman, Griffin Wheel Co., Chicago, Ill.
 F. B. Harriman, Gen. Supt., Ill. Cent. R. R., Chicago, Ill.
 N. F. Harriman, Engr. Tests, Union Pac. Ry., Omaha, Neb.
 D. T. Harris, Sales Agent, American Steel Foundries, Chicago, Ill.
 E. K. Harris, Carbon Steel Co., Chicago, Ill.
 G. C. Harris, Auditing Dept., C. B. & Q. Ry., Omaha, Neb.
 J. D. Harris, G. S. M. P., B. & O. R. R., Baltimore, Md.
 W. L. Harrison, S. M. P., C. R. I. & P. Ry., Cedar Rapids, Ia.
 B. R. Harscha, Rodger Ballast Car Co., Chicago, Ill.
 Bert Hartigan, M. E., Rutland R. R. Co., Rutland, Vt.
 J. W. Harty, G. W. A., Railway Steel Spring Co., Chicago, Ill.
 H. H. Harvey, G. C. I., C. B. & Q. Ry., Chicago, Ill.
 L. M. Harvey, Sales Engr., Allis-Chalmers Co., Milwaukee, Wis.
 H. B. Hatch, National Dump Car Co., Chicago, Ill.
 J. N. Hatch, Sargent & Lundy, Chicago, Ill.
 Jno. Havron, V. P. Latrobe Steel & Coupler Co., Chicago, Ill.
 Oliver Hawkins, Loco. Engr., C. B. & Q. Ry., Alliance, Neb.
 C. G. Hawley, Patent Lawyer, Railway Exchange Bldg., Chicago, Ill.
 Wm. Hawley, Fremont, Neb.
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 R. C. Hayes, Gen. Shop For., C. B. & Q. Ry., Plattsmouth, Neb.

- Bert Haynes, New York Air Brake Co., Chicago, Ill.
- J. R. Haynes, C. C. Pur. Agt., C. B. & Q. Ry., Chicago, Ill.
- O. C. Hayward, Secretary, Towsey Varnish Co., Chicago, Ill.
- John Heath, M. M., C. & N. W. Ry., Winnetka, Ill.
- W. H. Heckman, Special Insp., C. B. & Q. Ry., Chicago, Ill.
- Frank Hedley, Interborough Transit Co., New York City.
- T. A. Hedendahl, Repr., Westinghouse Air Brake Co., Denver, Colo.
- J. J. Hennessey, M. C. B., C. M. & St. P. Ry., W. Milwaukee, Wis.
- C. A. Henry, Piece Work Insp., C. B. & Q. Ry., Aurora, Ill.
- W. C. A. Henry, S. M. P., Pennsylvania R. R., Columbus, O.
- W. T. Henry, West. Repr., New York Air Brake Co., Chicago, Ill.
- E. Z. Hermansader, R. H. F., C. M. & St. P. Ry., Channing, Mich.
- H. H. Hettler, 132 Elston Ave., Chicago, Ill.
- E. M. Herr, Westinghouse Air Brake Co., Edgewood Park, Pa.
- Richard Hervig, Draftsman, C. B. & Q. Ry., Aurora, Ill.
- H. G. Hetzler, President, Metropolitan Elevated R. R., Chicago, Ill.
- H. H. Hewitt, 619 Lafayette Ave., Buffalo, N. Y.
- Wm. Hewitt, Foreman, C. & N. W. Ry., Belvidere, Ill.
- E. R. Hibbard, President, Grip Nut Co., Chicago, Ill.
- M. W. Hibbard, Pettibone, Mulligan Co., Chicago, Ill.
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- C. C. Higgins, 363 Winthrop Ave., Chicago, Ill.
- C. D. Higgins, Div. Foreman, C. & N. W. Ry., Boone, Ia.
- Samuel Higgins, G. M., N. Y. N. H. & H. R. R., New Haven, Conn.
- F. P. Hildreth, M. E., Vandalia R. R., Terre Haute, Ind.
- E. A. Hill, Chicago Grain Door Co., Chicago, Ill.
- C. P. Hill, Machinist, Illinois Central R. R., Chicago, Ill.
- G. H. Hill, Inspector, C. B. & Q. Ry., Aurora, Ill.
- J. W. Hill, 1015 Hamilton Blvd., Peoria, Ill.
- W. W. Hinch, A. & J. M. Anderson Mfg. Co., Chicago, Ill.
- A. C. Hincley, M. M., C. H. & D. Ry., Lima, O.
- J. B. L. Hinds, Gibson, Ind.
- Major Chas. Hine, Railway Examiner, Vienna, Va.
- C. B. Hodges, 44 Ferry Ave., Detroit, Mich.
- E. W. Hodgkins, V. P., L. J. Berdo Co., Chicago, Ill.
- C. M. Hoffman, M. M., Southern Railway, Princeton, Ind.
- W. H. Holcomb, P. A. office, C. M. & St. P. Ry., Chicago, Ill.
- C. B. Holdrege, G. S. A., Franklin Railway Supply Co., Chicago, Ill.
- P. M. Holdsworth, care F. W. Mahl, M. E., Colorado & Southern Ry., Denver, Colo.
- S. R. Holland, West. Sales Mgr., Eastern Granite Roofing Co., Chicago, Ill.
- S. E. Holmes, Draftsman, National Dump Car Co., Chicago, Ill.
- A. L. Holtzman, Rubberset Brush Co., Newark, N. J.
- P. W. Hood, The Tweedy-Randolph Co., Chicago, Ill.
- J. H. Hooper, M. M., Boyne City & South-eastern Ry., Boyne City, Mich.
- W. H. Hooper, G. A., Safety Car Heating & Lighting Co., Chicago, Ill.
- A. E. Hooven, Railway Review, 30 Church St., New York City.
- G. H. Hopkins, M. C. B., South Side Elevated R. R., Chicago, Ill.
- J. M. Hopkins, President, Camel Co., Chicago, Ill.
- L. A. Hopkins, Consolidated Supply Co., Chicago, Ill.
- M. J. Horan, G. L. F., Chicago Great Western Ry., Dubuque, Ia.
- J. Horrigan, S. M. P., Elgin, Joliet & Eastern Ry., Joliet, Ill.
- W. J. Hosceit, National Dump Car Co., Chicago, Ill.
- J. H. Houck, Supt., Aurora Boiler Works, Aurora, Ill.
- C. H. Howard, Harrison & Howard Iron Co., St. Louis, Mo.
- H. M. Howind, Davenport Loco. Works, Rock Island, Ill.
- C. E. Howard, Loco. Engr., C. B. & Q. Ry., Chariton, Iowa.
- G. E. Howard, V. P., Commonwealth Steel Co., St. Louis, Mo.
- H. B. Howe, New South Wales Gov't Rys., Sydney, N. S. W.
- C. B. Hoyt, Supt. Construction, N. Y. C. & St. L. Ry., Bellevue, O.
- W. E. Hubbard, New York Central & Hudson River Ry., New York City.
- G. O. Hockett, Road Foreman, C. B. & Q. Ry., Wymore, Neb.
- E. B. Hughes, Inspector, Wabash Ry., Paterson, N. J.
- E. E. Hull, Asst. F. C. D., C. B. & Q. Ry., Aurora, Ill.
- G. A. Hull, Mech. Eng. Dept., C. R. I. & P. Ry., Chicago, Ill.
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- C. J. Humphreys, Spencer Otis Co., Chicago, Ill.
- L. S. Hungerford, Jr., Peerless Rubber Co., Chicago, Ill.
- W. R. Hungerford, Mech. Insp., Pullman Co., Chicago, Ill.
- R. L. Huntley, P. A. E., Union Pacific Ry., Omaha, Neb.
- T. B. Hunt, Pennsylvania R. R., Ft. Wayne, Ind.
- Percival Hunter, Purchasing Dept., C. B. & Q. Ry., Chicago, Ill.
- C. F. Huntoon, Chicago Railway Equipment Co., Chicago, Ill.
- J. H. Hurlbut, Draftsman, C. R. I. & P. Ry., Chicago, Ill.
- J. D. Hurley, V. P., Independent Pneumatic Tool Co., Chicago, Ill.
- C. I. Hutton, Div. Supt. Burma Rys. Co., Ltd., Insein, Burma, India.
- G. C. Isbester, Quincy, Manchester, Sargent Co., Chicago, Ill.
- G. R. Ingersoll, C. C. Pur. Agt., L. S. & M. S. Ry., Cleveland, O.
- E. S. Jackman, Western Agent, Firth Sterling Steel Co., Chicago, Ill.
- C. F. Jacobson, Foreman Machine Shops, L. S. & M. S. Ry., Elkhart, Ind.

- E. J. Jackson, Machinist, C. B. & Q. Ry., Chicago, Ill.
 J. A. Jackson, G. F., Chicago Refr. Car Co., Chicago, Ill.
 O. S. Jackson, R. H. F., C. I. & L. Ry., Indianapolis, Ind.
 W. J. Jackson, Loco. Engr., C. & W. I. Ry., Chicago, Ill.
 W. O. Jacquette, Dist. Mgr., Manning, Maxwell & Moore, New York City.
 E. D. Jameson, A. M. M., Grand Trunk Ry., Battle Creek, Mich.
 Wm. Jappert, Car Foreman, C. B. & Q. Ry., Lincoln, Neb.
 J. J. Jaschka, National Malleable Castings Co., Chicago, Ill.
 E. Z. Jefferson, Quaker City Rubber Co., Pittsburg, Pa.
 B. H. Jeffries, Loco. Engr., Wabash Ry., Chicago, Ill.
 C. D. Jenks, Sales Agt., Pressed Steel Car Co., Chicago, Ill.
 D. F. Jennings, Stewart Mowry Co., Chicago, Ill.
 E. E. Jett, Supt. Car Shops, Morris & Co., Chicago, Ill.
 Jacob Johann, Springfield, Ill.
 M. E. Johns, 117 Green St., Jersey City, N. J.
 August Johnson, Engr., Elgin, Joliet & Eastern Ry., Joliet, Ill.
 A. B. Johnson, Salesman, Westinghouse Machine Co., St. Louis, Mo.
 C. H. Johnson, G. F. L. D., Michigan Central R. R., Chicago, Ill.
 E. G. Johnson, Brunswick Hotel, Moncton, N. B.
 F. J. Johnson, American Hoist & Derrick Co., Chicago, Ill.
 F. L. Johnson, Supt., C. B. & Q. Ry., Chicago, Ill.
 W. W. Johnson, G. M., Standard Magnesia Co., Franklin, Pa.
 H. A. Johnson, Engr. Car Equip., Metropolitan Elevated R. R., Chicago, Ill.
 H. W. Johnson, D. M. M., C. B. & Q. Ry., Brookfield, Mo.
 J. W. Johnson, Pyle Natl. Elec. H. L. Co., Chicago, Ill.
 R. H. Johnson, G. M., Peoria & Pekin Union Ry., Peoria, Ill.
 W. O. Johnson, M. M., Empire Shops, Canal Zone.
 H. C. Johnstone, F. A. Lester & Co., Chicago, Ill.
 B. D. Jones, Jones Car Door Co., Chicago, Ill.
 R. E. Jones, Engr., C. B. & Q. Ry., Burlington, Ia.
 B. M. Jones, B. M. Jones & Co., Boston, Mass.
 E. H. Jones, Secretary Northwestern Expanded Metal Co., Chicago, Ill.
 E. F. Jones, M. M., Chicago & Western Indiana Ry., Chicago, Ill.
 F. B. Jones, Adams & Westlake Co., Chicago, Ill.
 L. E. Jones, American Steel Foundries, Chicago, Ill.
 M. T. Jones, Insp. Engr., American Bureau of Inspection & Tests, Chicago.
 W. A. Jones, Pennsylvania Lines West, Ft. Wayne, Ind.
 W. E. Jones, G. F., German-American Car Lines, Chicago, Ill.
 G. R. Joughins, M. S. Intercolonial Ry., Moncton, N. B. Canada.
 B. Julien, G. F. C. D., Union Pacific R. R., Omaha, Neb.
 R. B. Kadish, 99 Hill Street, Chicago, Ill.
 I. N. Kalbaugh, S. M. P., Coal & Coke Ry., Gassaway, W. V.
 F. W. Kapnick, Engr., Chicago & Western Indiana Ry., Chicago, Ill.
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 Jacob Kastlin, Supt. Davenport Loco. Works, Davenport, Ia.
 F. J. Keckefoth, Mach. For., C. & N. W. Ry., Winona, Minn.
 J. E. Keegan, S. M. P., Grand Rapids & Indiana Ry., Grand Rapids, Mich.
 B. A. Keeler, Chicago Car Heating Co., Chicago, Ill.
 C. E. Keenan, M. M., N. Y. C. Lines, New Durham, N. J.
 Sanford Keeler, Nathan Mfg. Co., Chicago, Ill.
 J. J. Keleher, Dist. For., U. P. R. R., Council Bluffs, Ia.
 C. L. Keller, 1st Asst. Engr., Scherzer Lift & Bridge Co., Chicago, Ill.
 H. D. Kelly, Demonstrator, C. & N. W. Ry., Chicago, Ill.
 J. W. Kelly, Foreman Boiler Maker, C. & N. W. Ry., Oak Park, Ill.
 M. J. Kelley, Supt. Ill. Nor. Ry., Chicago, Ill.
 W. A. Kelley, R. F. E., C. B. & Q. Ry., Burlington, Ia.
 Wm. V. Kelley, Simplex Railway Appliance Co., Chicago, Ill.
 R. G. Kelley, Spec. App., L. S. & M. S. Ry., Collinwood, O.
 H. F. Kellogg, M. E., C. N. Y. & B. Rfg. Co., Chicago, Ill.
 W. L. Kellogg, M. M., Pere Marquette Ry., Grand Rapids, Mich.
 Willard Kells, M. M., Lehigh Valley Ry., Buffalo, N. Y.
 A. L. Kendall, W. P. Taylor Co., New York City.
 O. O. Kendall, Engineer, Chicago & Western Indiana Ry., Chicago, Ill.
 R. B. Kendig, M. E., L. S. & M. S. Ry., Cleveland, O.
 Chas. Kennedy, Brown & Co., Inc., Chicago, Ill.
 C. L. Kennicott, Kennicott Water Softener Co., Chicago, Ill.
 S. K. Kenower, Dixon, Ill.
 E. R. Kent, E. R. Kent & Co., Chicago, Ill.
 H. P. Kepner, Piece Work Inspr., C. B. & Q. Ry., Havelock, Neb.
 H. H. Kerr, Westinghouse, Church, Kerr & Co., Chicago, Ill.
 J. A. Kershaw, Supt. Air Brakes, C. M. & St. P. Ry., W. Milwaukee, Wis.
 E. M. Kerwin, Sprague Electric Co., Chicago, Ill.
 H. J. Kessler, Draftsman, C. B. & Q. Ry., Lincoln, Neb.
 H. B. Ketzle, National Dump Car Co., Chicago, Ill.
 S. J. Kidder, Westinghouse Air Brake Co., 165 Broadway, New York City.
 Chas. Kilander, American Steam Gage & Valve Mfg. Co., Chicago, Ill.
 J. B. Kilpatrick, Asst. S. M. P., C. R. I. & P. Ry., Chicago, Ill.
 N. S. Kimball, M. M., C. M. & St. P. Ry., Green Bay, Wis.
 C. H. King, Machinist, L. S. & M. S. Ry., Chicago, Ill.

- F. I. King, 137 E. Front St., Dunkirk, N. Y.
- C. W. Kinney, 410 St. Clair Ave., Columbus, O.
- A. R. Kipp, S. M. P., Wis. Cent. R. R., Fond du Lac, Wis.
- T. B. Kirby, Railway Exchange Bldg., Chicago, Ill.
- J. Kirk, Supt., Chicago, Lake Shore & Eastern Ry., Chicago, Ill.
- John Kirkby, Mechanical Engineer, Pilsley, Chesterfield, England.
- M. M. Kirkman, V. P. Chicago & Northwestern Ry., Chicago, Ill.
- W. B. Klee, Damascus Bronze Co., Pittsburgh, Pa.
- Chas. Kleeman, C. R. I. & P. Ry., Chicago, Ill.
- Geo. Kleifgen, New York Air Brake Co., Chicago, Ill.
- D. Z. Kline, F. C. R., Grand Rapids & Indiana Ry., Grand Rapids, Mich.
- H. L. Kolman, West Disinfecting Co., Chicago, Ill.
- C. F. Kopf, Griffin Wheel Co., Chicago, Ill.
- F. J. Kraemer, R. F. E., C. B. & Q. Ry., Little Rock, Ark.
- Chas. Krau, Asst. R. H. F., L. S. & M. S. Ry., Elkhart, Ind.
- A. S. Krohn, Loco. Engr., L. S. & M. S. Ry., Chicago, Ill.
- T. N. Kucher, M. M., Toledo, Peoria & Western Ry., Peoria, Ill.
- E. E. Kretschmer, Northwestern Elevated R. R., Chicago, Ill.
- J. C. Kuhns, A. P. A., Illinois Central R. R., Chicago, Ill.
- P. M. LaBach, Draftsman, C. R. I. & P. Ry., Chicago, Ill.
- Wm. Lalor, Foreman, C. B. & Q. Ry., Galesburg, Ill.
- M. B. Lambert, Engr., Westinghouse Elec. & Mfg. Co., Chicago, Ill.
- R. P. Lamont, V. P., Simplex Railway Appliance Co., Hammond, Ind.
- J. S. Lanby, Apprentice Instr., L. S. & M. S. Ry., Elkhart, Ind.
- J. R. Lancaster, Insp. Materials, L. S. & M. S. Ry., Cleveland, O.
- E. H. Landers, Storekeeper, L. S. & M. S. Ry., Chicago, Ill.
- J. N. Langan, Chicago Indiana & Southern Ry., Kankakee, Ill.
- M. LaQuay, 1329 E. 9th Street, Kansas City, Mo.
- H. LaRue, M. C. B., C. R. I. & P. Ry., Chicago, Ill.
- J. S. Lauder, Louisville & Nashville Ry., So. Louisville, Ky.
- G. F. Laughlin, Supt. Shops, Armour Car Lines, Kansas City, Kas.
- W. K. Lavis, Piece Work Insp., C. B. & Q. Ry., Aurora, Ill.
- T. A. Lawes, M. M., Southern Indiana Ry., Bedford, Ind.
- F. A. Lawler, Crucible Steel Co., Chicago, Ill.
- W. M. Lawler, Asst., G. S. M., Bliss Electric Car Lighting Co., Chicago, Ill.
- W. C. Lawson, Ritter Foldingdoor Co., Chicago, Ill.
- T. E. Layden, Asst. Engr. Tests, A. T. & S. F. Ry., Topeka, Kan.
- J. F. Laying, Engr., Westinghouse Elec. & Mfg. Co., Baltimore, Md.
- L. H. Ledger, Loco. Engr., A. T. & S. F. Ry., Los Angeles, Cal.
- E. H. Lee, Chief Engr., Chicago & Western Indiana Ry., Chicago, Ill.
- Frank Lee, Asst. Engr., Canadian Pacific Ry., Winnipeg, Man.
- W. C. Lee, Storekeeper, Illinois Steel Co., Chicago, Ill.
- E. B. Leigh, V. P., Chicago Ry. Equipment Co., Chicago, Ill.
- E. F. Leigh, Chicago Railway Equipment Co., Chicago, Ill.
- F. B. Leopold, 718 Maple Ave., Sewickley, Pa.
- C. F. Leppla, Draftsman, C. R. I. & P. Ry., Chicago, Ill.
- F. A. Lester, Wolf Frame Truck Co., Chicago, Ill.
- J. C. Lester, Spokane, Wash.
- H. R. Lewellyn, Asst. T. M., C. B. & Q. Ry., St. Joe, Mo.
- B. F. Lewis, Railway Appliance Co., Chicago, Ill.
- E. Lewis, G. M., Solid Draft Rigging & Equipment Co., Terre Haute, Ind.
- E. Lewis, Westinghouse Machine Co., Chicago, Ill.
- F. S. Lewis, Illinois Steel Co., Chicago, Ill.
- J. H. Lewis, F. R. H., C. B. & Q. Ry., Chicago, Ill.
- W. H. Lewis, S. M. P., Norfolk & Western Ry., Roanoke, Va.
- J. H. Leyonmark, M. E., Chicago & Alton Ry., Bloomington, Ill.
- W. A. Libkeman, Standard Steel Car Co., Chicago, Ill.
- J. E. Libby, M. C. B., Swift Refr. Car Line, Chicago, Ill.
- H. T. Person, Library, Tuck School, Hanover, N. H.
- T. G. Lickey, Asst. Foreman, L. S. & M. S. Ry., Chicago, Ill.
- R. M. Lickey, C. D., New York, New Haven & Hartford R. R., New Haven, Conn.
- G. H. Likert, M. M., Union Pacific Ry., Omaha, Neb.
- M. T. Lightner, Mechanical Dept., Chicago & Alton Ry., Bloomington, Ill.
- C. A. Lindstrom, C. E., Pressed Steel Car Co., Allegheny, Pa.
- J. A. Lister, Insp., Pittsburg Testing Laboratory, Evanston, Ill.
- J. C. Little, M. E., C. & N. W. Ry., Chicago, Ill.
- J. T. Llewellyn, Chicago Malleable Castings Co., Pullman, Ill.
- B. D. Lockwood, M. E., C. C. C. & St. L. Ry., Indianapolis, Ind.
- J. H. Lonie, A. M. E., American Steel Foundries, Granite City, Ill.
- H. L. Loomis, 827 Rookery Bldg., Chicago, Ill.
- Alfred Lovell, 819 Harrison Bldg., Philadelphia, Pa.
- C. P. Lovell, New York Air Brake Co., Chicago, Ill.
- R. S. Lowder, care S. M. P., B. & A. Ry., Milo Junction, Me.
- Houston Lowe, Lowe Bros. Co., Dayton, O.
- W. W. Lowell, D. M. M., C. B. & Q. Ry., St. Joseph, Mo.
- J. A. Lounsbury, V. P., Greenlee Bros. Co., Chicago, Ill.
- J. A. Loy, M. M., C. R. I. & P. Ry., Rock Island, Ill.
- F. M. Lucore, 407 Grand Central Station, Chicago, Ill.

- Wm. Lucy, Loco. Engr., Chicago & Western Indiana Ry., Chicago, Ill.
 C. G. Ludlow, Crosby Steam Gage & Valve Co., Chicago, Ill.
 C. J. Lunquist, Foreman, Coach Repairs, C. M. & St. P. Ry., Minneapolis, Minn.
 Tracy Lyon, Westinghouse Electric & Mfg. Co., Pittsburg, Pa.
 Jas. Lyman, Engineer, General Electric Co., Chicago, Ill.
 W. J. Lynch, P. M., N. Y. C. Lines, Chicago, Ill.
 J. W. Mabbs, C. E., Board of Trade, Chicago, Ill.
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 D. R. MacKenzie, Loco. Foreman, Chicago Great Western Ry., Chicago, Ill.
 Jno. Mackenzie, 60 Hawthorne Ave., Cleveland, O.
 J. F. Mackie, Secretary, Train Despatchers Ass'n of America, Chicago, Ill.
 R. Mackie, Burma Rys., Insein, Burma, India.
 W. H. Maddocks, Missouri, Kansas & Texas Ry., Parsons, Kan.
 A. F. Macpherson, 1590 Old Colony Bldg., Chicago, Ill.
 S. Madson, C. F., C. G. W. Ry., Oak Park, Ill.
 W. E. Magraw, V. P., The Railway List Co., Chicago, Ill.
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 Peter Maher, S. M. P., C. & A. Ry., Bloomington, Ill.
 J. H. Mallon, T. M., South Side Elevated R. R., Chicago, Ill.
 Geo. B. Maltby, 516 American Trust Bldg., Chicago, Ill.
 A. E. Manchester, S. M. P., C. M. & St. P. Ry., W. Milwaukee, Wis.
 P. Manchester, Quincy, Manchester Sargent Co., Chicago, Ill.
 H. S. Mann, Engineer, Wabash Ry., Chicago, Ill.
 J. F. Mann, G. C. F., P. M. R. A., Saginaw, Mich.
 J. H. Manning, S. M. P., Delaware & Hudson Co., Albany, N. Y.
 M. Marea, M. M., Toledo, St. Louis & Western Ry., Frankfort, Ind.
 Chas. Markel, Foreman, C. & N. W. Ry., Clinton, Ia.
 J. T. Markham, Sellers Mfg. Co., Chicago, Ill.
 Herbert Markle, Northern Electrical Mfg. Co., Chicago, Ill.
 J. R. Markle, Secretary, J. F. McCanna Co., Chicago, Ill.
 H. W. Marsh, Trav. M. M., C. G. W. Ry., Chicago, Ill.
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 W. H. Marshall, American Locomotive Co., New York City.
 P. A. Martin, National Car Line Co., Chicago, Ill.
 R. P. Bigelow, Librarian, Massachusetts Institute of Technology, Boston, Mass.
 N. Maus, 1603 Prairie Ave., Chicago, Ill.
 A. R. McAlpine, 1434 Monadnock Block, Chicago, Ill.
 Edward McArdle, Columbus Pneumatic Tool Co., Chicago, Ill.
 Eugene McAuliffe, General Fuel Agt., Rock Island Lines, Chicago, Ill.
 Chas. McCann, Chicago Junction Ry., Chicago, Ill.
 J. J. McCarthy, 735 Old Colony Bldg., Chicago, Ill.
 Edw. McCarthy, R. H. F., Ill. Cent. R. R., Chicago, Ill.
 J. M. McCarthy, C. C. to G. P. A., Rock Island Lines, Chicago, Ill.
 M. J. McCarthy, C. C. C. & St. L. Ry., Beech Grove, Ind.
 H. O. McClain, Draftsman, Ill. Cent. R. R., Chicago, Ill.
 J. H. McConnell, Pittsburg, Pa.
 A. C. McCord, McCord & Co., Chicago, Ill.
 A. McCormick, Supt., Hicks Loco. & Car Works, Chicago Heights, Ill.
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 J. G. McGee, 90 West Street, New York City.
 C. P. McGinniss, 2807 Polk Street, Minneapolis, Minn.
 R. J. McGrail, C. C. to S. M. P., Toledo, St. Louis & Western Ry., Bloomington, Ill.
 J. A. McGrew, National Engineering Co., Columbus, O.
 J. H. McGoff, M. M., A. T. & S. F. Ry., Ft. Madison, Ia.
 R. L. McIntosh, Asst. M. E., Missouri Pacific Ry., St. Louis, Mo.
 Wm. McIntosh, S. M. P., Central R. R. of New Jersey, Jersey City, N. J.
 W. T. McKee, 71 West Main Street, Mt. Sterling, Ky.
 W. R. McKeen, Jr., Consulting Engr. Motor Cars, Union Pacific Ry., Omaha, Neb.
 A. J. McKillop, M. M., Illinois Central R. R., Freeport, Ill.
 S. C. McKnight, 7772 Hawthorne Ave., Chicago, Ill.
 J. G. McLaren, Delhart, Texas.
 A. H. McLean, M. M., C. R. I. & P. Ry., Urbana, Ill.
 H. B. McLelland, Jenkins Bros., Chicago, Ill.
 W. N. McMunn, Latrobe Steel & Coupler Co., Chicago, Ill.
 W. V. McNamara, Car Foreman, Norfolk & Western Ry., Williamson, W. Va.
 Jas. McNaughton, American Locomotive Co., Schenectady, N. Y.
 M. B. McNulty, Pratt & Lambert Varnish Co., Chicago, Ill.
 J. H. McPartland, Insp. Car Service, C. B. & Q. Ry., Burlington, Ia.
 J. A. McRae, M. E., Michigan Central R. R., Detroit, Mich.
 G. E. McVicar, Galena Oil Co., Franklin, Pa.
 Robt. McVicar, Galena Signal Oil Co., St. Paul, Minn.
 C. H. Mead, Empire, Canal Zone.
 J. A. Meaden, G. M., Paul Dickinson, Inc., Chicago, Ill.
 W. C. Medland, Piece Work Insp., L. S. & M. S. Ry., Beech Grove, Ind.

- H. Meeder, R. H. F., C. & E. I. R. R., Dolton, Ill.
- W. R. Meeder, Gen. Foreman, C. & E. I. R. R., Dolton, Ill.
- J. E. Mehan, Asst. to M. C. B., C. M. & St. P. Ry., Milwaukee, Wis.
- C. W. Melcher, Western Mgr., Ingersoll Sargent Drill Co., Chicago, Ill.
- W. P. Mellon, Valentine Varnish Co., Chicago, Ill.
- W. G. Menzel, Fond du Lac, Wis.
- G. W. Merrell, Asst. to G. M., Norfolk & Western Ry., Roanoke, Va.
- H. T. Mercur, Ry. Materials Co., Chicago, Ill.
- F. Mertsheimer, G. S. M. P., K. C. M. & O. Ry., Kansas City, Mo.
- L. F. Michael, Draftsman, C. & N. W. Ry., Chicago, Ill.
- R. Michener, Mgr., Chicago Branch, Crucible Steel Co., Chicago, Ill.
- S. W. Midgley, Curtain Supply Co., Chicago, Ill.
- C. M. Mileham, 7207 Howard Ave., Chicago, Ill.
- C. E. Miller, Locomotive Engr., C. I. & S. Ry., Kankakee, Ill.
- E. C. Miller, Foreman, Pittsburg & Lake Erie Ry., Glassport, Pa.
- F. W. Miller, Salesman, J. L. Yale & Co., Chicago, Ill.
- H. I. Miller, G. M., C. R. I. & P. Ry., Chicago, Ill.
- E. A. Miller, S. M. P., N. Y. C. & St. L., Cleveland, O.
- P. J. Miller, R. F. E., L. S. & M. S. Ry., Toledo, O.
- Wm. Miller, V. P. Adreon Mfg. Co., Chicago, Ill.
- W. L. Miller, W. L. Miller Heating Co., Chicago, Ill.
- S. W. Miller, Supt., American Car & Fdy. Co., Providence, R. I.
- Wm. Miller, Dunmore, Pa.
- J. T. Milner, 1407 Fisher Bldg., Chicago, Ill.
- Geo. F. Mills, Niles-Bement-Pond Co., Chicago, Ill.
- H. A. Milligan, T. M., C. I. St. E. Ry., Gary, Ind.
- C. W. Millsbaugh, Chief Draftsman, Mich. Cent., W. Detroit, Mich.
- W. H. Miner, 669 Rookery Bldg., Chicago, Ill.
- P. P. Mirtz, C. D., L. S. & M. S. Ry., Elkhart, Ind.
- A. E. Mitchell, 50 Church St., New York.
- J. H. Mitchell, M. E., Pressed Steel Car Co., Chicago, Ill.
- J. R. Mitchell, W. H. Miner Co., Chicago, Ill.
- W. N. Mitchell Ry. Dept., International Corr. Schools, Chicago, Ill.
- Samuel Moffit, 811 Carroll St., Saginaw, Mich.
- C. E. Mohle, Specialist, C. & N. W. Ry., Oak Park, Ill.
- G. E. Molleson, Tyler Tube & Pipe Co., 26 Cortland St., New York City.
- H. H. Molyneaux, C. L. S. & E. Ry., Chicago, Ill.
- M. S. Monroe, M. M., Chicago, Lake Shore & Eastern Ry., 229 74th Place, Chicago, Ill.
- H. Montgomery, S. M. P., B. and A. Ry., Milo Junction, Me.
- W. O. Moody, Chief Draftsman, Ill. Cent. R. R., 3539 Ellis Ave., Chicago, Ill.
- N. L. Moon, Supt. Lehigh Valley Ry., Wilkesbarre, Pa.
- A. C. Moore, Safety Car Htg. & Ltg. Co., Chicago, Ill.
- B. R. Moore, care Miss. Cent. R. R., Hattiesburg, Miss.
- C. B. Moore, American Locomotive Equipment Co., Railway Exchange, Chicago, Ill.
- P. W. Moore, Ry. Specialty & Supply Co., Chicago, Ill.
- Edw. Moran, Shop Foreman, C. M. & St. P. Ry., W. Milwaukee, Wis.
- H. S. Mored, R. F. E., C. B. & Q. Ry., Ottumwa, Ia.
- O. H. Morgan, Chicago Varnish Co., Chicago, Ill.
- A. D. Morris, H. W. Johns Manville Co., Chicago, Ill.
- W. S. Morris, 813 Berry St., Fort Wayne, Ind.
- T. A. Morris, Loco. Engr., Elgin, Joliet & Eastern Ry., Waukegan, Ill.
- T. R. Morris, G. F. C. D., C. M. & St. P. Ry., Chicago, Ill.
- H. U. Morton, V. P., National Mfg. & Supply Co., Chicago, Ill.
- E. A. Mosely, Secretary, Interstate Commerce Commission, Washington, D. C.
- J. W. Motherwell, The Ashton Valve Co., Chicago, Ill.
- W. B. Moulton, Smoke Inspnr., C. M. & St. P. Ry., Evanston, Ill.
- H. E. Muchnic, Locomotive Finished Material Co., Atchison, Kan.
- Joseph Muhleisen, Loco. Engr., T. St. L. & W. Ry., Elkhart, Ind.
- J. E. Muhlfield, Baltimore, Md.
- N. H. Mull, Spec. Appr., C. B. & Q. Ry., Aurora, Ill.
- F. T. Mullen, Cont. Frt. Agt., A. T. & S. F. Ry., Chicago, Ill.
- J. R. Mullen, C. C. M. P., Dept., Chicago, Lake Shore & Eastern Ry., Chicago, Ill.
- E. T. Munger, M. M., Metropolitan West Side Elevated R. R., 137 Christopher St., New York.
- W. A. Murray, Supt. B. & O., New York Central & Hudson River Ry., Canandaigua, New York.
- John Murrin, Shop Foreman, C. & N. W. Ry., Chicago, Ill.
- C. C. Murphy, Standard Railway Equipment Co., Chicago, Ill.
- J. P. Murphy, G. S. K., L. S. & M. S. Ry., Collinwood, O.
- J. Z. Murphy, Engr., Chicago Union Traction Co., Chicago, Ill.
- John Murray, R. H. F., Chicago & Western Indiana Ry., Chicago, Ill.
- C. A. Nathan, Nathan Mfg. Co., Chicago, Ill.
- C. R. Naylor, T. H. Symington Co., Chicago, Ill.
- N. C. Naylor, Railway Steel Spring Co., Chicago, Ill.
- B. J. Neeley, Jenkins Bros., Chicago, Ill.
- J. P. Neff, 525 So. Poplar Ave., Austin, Ill.
- J. O. Neikirk, Rodger Ballast Car Co., Chicago, Ill.
- C. B. Nelson, Eng. Desp., L. S. & M. S. Ry., Elkhart, Ind.
- L. E. Nelson, Pur. Dept., C. M. & St. P. Ry., Chicago, Ill.

- W. A. Nettleton, G. S. M. P., C. R. I. & P. Ry., Chicago, Ill.
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 J. G. Neuffer, Supt. Mach., Ill. Cent. R. R., Chicago, Ill.
 W. E. New, M. M., Kansas City Belt Ry., Kansas City, Mo.
 M. L. Newhall, Repr., G. M. Newhall Eng. Co., Chicago, Ill.
 G. P. Nichols, Geo. P. Nichols & Bros., Chicago, Ill.
 F. H. Niles, Blue Island Car & Equipment Co., Pullman, Ill.
 W. E. Niles, Secy., Ontario Nor. & Mich. Ry., Chicago, Ill.
 G. W. Nistle, R. F. D. No. 8, Muskegon, Mich.
 R. F. Nixon, Piece Work Insp., C. B. & Q. Ry., Chicago, Ill.
 L. C. Noble, A. French Spring Co., Chicago, Ill.
 J. J. Noland.
 Martin Norell, Draftsman, National Dump Car Co., Chicago, Ill.
 L. A. North, Machine Shop Foreman, Ill. Cent. R. R., Chicago, Ill.
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 H. C. Nutt, Gen. Mgr., Nor. Pac. Ry., Tacoma, Wash.
 W. H. Nuttall, S. M. P., Manistee & North Eastern Ry., Manistee, Mich.
 G. F. Oakey, Pass. For., C. & A. R. R., Chicago, Ill.
 E. F. O'Boyle.
 J. F. O'Connor, W. H. Miner Co., Chicago, Ill.
 A. J. Odegaard, Pur. Dept., C. R. I. & P. Ry., Chicago, Ill.
 Wm. O'Herin, Supt. Mach., Missouri, Kansas & Texas Ry., Parsons, Kan.
 E. W. Olds, S. R. S., Milwaukee Electric Railway & Light Co., Milwaukee, Wis.
 C. J. Olmstead, Westinghouse Air Brake Co., Chicago, Ill.
 O. M. Olson, Spencer Otis Co., Chicago, Ill.
 J. W. O'Leary, A. J. O'Leary & Son, Chicago, Ill.
 Thos. O'Neal, C. B. & Q. Ry., Lincoln, Neb.
 E. H. O'Neill, Asst. to G. S., Manistee & North Eastern Ry., Manistee, Mich.
 J. R. Onderdonk, E. of T., B. & O. R. R., Baltimore, Md.
 F. J. O'Rourke, Gen. Foreman, Chicago, Indiana & Southern Ry., Gibson, Ind.
 T. M. Orr, Cook Standard Tool Co., Kalamazoo, Mich.
 C. H. Osborne, C. & N. W. Ry., Chicago, Ill.
 H. L. Osman, S. C. S., Morris & Co., Chicago, Ill.
 J. E. Osmer, M. M., Northwestern Elevated R. R., Chicago, Ill.
 Albert Ostberg, care M. M., C. B. & Q. Ry., Hannibal, Mo.
 O. F. Ostby, Sales Mgr., Commercial Acetylene Co., New York City.
 H. C. Osterman, President, Osterman Mfg. Co., Chicago, Ill.
 Spencer Otis, Railway Exchange Bldg., Chicago, Ill.
 B. F. Otley, Otley Cement Co., Chicago, Ill.
 O. W. Ott, Chief Draftsman, Oregon Short Line R. R., Salt Lake City, Utah.
 L. E. Otte, A. C. Torbert & Co., Chicago, Ill.
 Oscar Otto, Supt. Shops, C. & N. W. Ry., Chicago, Ill.
 Elmo Owen, 5327 Abbott Place, Los Angeles, Cal.
 C. B. Owens, West. Sales Agt., Youngstown Car Mfg. Co., Chicago, Ill.
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 A. D. Page, P. A. E., C. R. I. & P. Ry., Chicago, Ill.
 E. L. Palmer, H. B. Dodge & Co., Chicago, Ill.
 L. G. Parish, S. M. P., L. S. & M. S. Ry., Cleveland, O.
 H. S. Park, Chicago Junction Ry., 3733 Langley Ave., Chicago, Ill.
 L. L. Park, New York Central & Hudson River R. R., Paterson, N. J.
 P. Park, G. F., Swift Refr. Line, Chicago, Ill.
 S. T. Park, S. M. P., C. & E. I. R. R., Danville, Ill.
 W. L. Park, Gen. Supt. Union Pacific Ry., C. S. Parker, Secretary Parker Car Heating Co., London, Ont., Canada.
 Pearl Parker, D. F. F., C. I. & S. Ry., Kankakee, Ill.
 W. B. Parker, National Paint Works, Chicago, Ill.
 G. E. Parks, M. M., Michigan Central R. R., Jackson, Mich.
 Otis Parsons, Atlantic Equipment Co., Chicago, Ill.
 E. Parsons, Asst. Supt. Tel., Ill. Cent. R. R., Chicago, Ill.
 H. E. Passmore, M. M., Toledo & Ohio Central Ry., Kenton, O.
 A. J. Passino, Secy. Brady Brass Co., Jersey City, N. J.
 W. C. Patrick, Edison Mfg. Co., Chicago, Ill.
 W. B. Paulson, Buda Fdg. & Mach. Co., Chicago, Ill.
 Thos. Paxton, S. M. P., El Paso & Southwestern Ry., El Paso, Texas.
 Geo. S. Payson, General Counsel, Western R. R. Ass'n, Chicago, Ill.
 F. R. Pechin, Supt. Wis. Div., C. & N. W. Ry., Chicago, Ill.
 C. L. Peck, Chicago & Western Indiana Ry., Chicago, Ill.
 F. C. Peck, Standard Brake Shoe Co., Chicago, Ill.
 P. H. Peck, M. M., Chicago & Western Indiana Ry., Chicago, Ill.
 W. D. Pence, Professor of C. E., University of Wisconsin, Madison, Wis.
 Carl Penner, Standard Metal Mfg. Co., Chicago, Ill.
 H. C. Pentecost, Draftsman, American Locomotive Co., Dunkirk, N. Y.
 J. R. Peoples, Machinist, C. B. & Q. Ry., W. Burlington, Ia.
 E. C. Perry, Trav. Salesman, Mechanical Rubber Co., Chicago, Ill.
 D. M. Perine, S. M. P., Pennsylvania R. R., Pittsburgh, Pa.
 F. W. Perry, C. C. Loco. Shops, L. S. & M. S. Ry., Elkhart, Ind.
 H. M. Perry, Perry Side Bearing Co., Joliet, Ill.
 W. M. Perry, Electrician, Chicago & Western Indiana Ry., Chicago, Ill.
 H. W. Peters, Gen. Air Brake Instr., C. & N. W. Ry., Chicago, Ill.

- John Peters, Gen. Foreman, Grand Trunk Ry., Chicago, Ill.
- C. H. Peterson, Sales Agt., Standard Steel Works, Chicago, Ill.
- C. W. Peterson, Chief Draftsman, C. R. I. & P. Ry., Chicago, Ill.
- F. W. Peterson, M. M. C. & N. W. Ry., Green Bay, Wis.
- C. D. Pettis, 303 Railway Exchange Bldg., Chicago, Ill.
- John Pfeifer, Foreman, C. B. & Q. Ry., Creston, Ia.
- C. W. Pflager, Asst. Mech. Supt., The Pullman Co., Chicago, Ill.
- H. M. Pflager, Commonwealth Steel Co., St. Louis, Mo.
- F. G. Phegley, American Engineering Specialty Co., Chicago, Ill.
- E. L. Philipp, Prest. Union Refr. Trans. Co., Milwaukee, Wis.
- L. R. Phillips, National Tube Co., Chicago, Ill.
- D. L. Phipps, Supt. Chicago Refr. Car Co., Chicago, Ill.
- C. F. Pierce, New York & New Jersey Lubricant Co., New York City.
- W. R. Pierce, Mgr., Revere Rubber Co., Chicago, Ill.
- C. J. Pilliod, G. F., T. St. L. & W. Ry., Frankfort, Ind.
- F. E. Pilliod, The Pilliod Co., Swanton, O.
- H. Pilliod, The Pilliod Co., Chicago, Ill.
- A. B. Pirie, M. M., B. & M. R. R. Wyomere, Neb.
- W. D. Pickles, American Engineering Specialty Co., Chicago, Ill.
- J. D. Pickard, Asst. to Engr. Tests, A. T. & S. F. Ry., Topeka, Kan.
- J. A. Pilcher, M. E., Norfolk & Western Ry., Roanoke, Va.
- F. E. Place, Buda Fdy. & Machine Co., Harvey, Ill.
- John Player, 319 Franklin Ave., River Forest, Ill.
- Geo. S. S. Playfair, 23 Court St., Boston, Mass.
- Thos. Plunkett, Revere Rubber Co., Chicago, Ill.
- W. P. Poland, V. P., Philippine Ry., Manila, P. I.
- C. H. Polley, C. C., Osterman Mfg. Co., Chicago, Ill.
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- C. J. Poor, Draftsman, Rutland R. R., Rutland, Vt.
- Geo. H. Porter, West. Elec. Co., Chicago, Ill.
- G. A. Post, Prest., Standard Coupler Co., New York City.
- Geo. L. Potter, V. P., B. & O. R. R., Baltimore, Md.
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- Robt. Quayle, S. M. P., C. & N. W. Ry., Chicago, Ill.
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- C. J. Quimby, Wis. Central Ry., Chicago, Ill.
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- H. J. Quinnell, For., Ill. Cent. R. R., Chicago, Ill.
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- R. C. Raines, R. H. F., Norfolk & Western Ry., Williamson, W. V.
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- V. C. Randolph, Loco. Engr., Erie R. R., Salamanca, N. Y.
- C. L. Ransom, Res. Engr., C. & N. W. Ry., Omaha, Neb.
- M. E. Rapp, G. F. L. D., C. M. & St. P. Ry., Chicago, Ill.
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- J. N. Reynolds, The Railway Age, Chicago, Ill.
- G. W. Rhodes, St. Louis Road, Quebec, Canada.
- F. C. Rice, Gen. Supt., C. B. & Q. Ry., Chicago, Ill.
- G. H. Rice, City Electrician, Chicago, Ill.
- R. C. Richards, Gen. Claim Agt., C. & N. W. Ry., Chicago, Ill.
- W. F. Richards, M. E., Gould Coupler Co., Depew, N. Y.

- C. F. Richardson, G. R. H. of E., St. Louis & San Francisco Ry., St. Louis, Mo.
- W. P. Richardson, M. E., Pittsburg & Lake Erie R. R., Pittsburg, Pa.
- F. L. Richmond, Gen. Yardmaster, C. & E. I. R. R., Brazil, Ind.
- O. P. Richmond, Supt. Shops, Armour Car Lines, So. Omaha, Neb.
- W. E. Ricketson, Spec. Appr., L. S. & M. S. Ry., Elkhart, Ind.
- Chas. Riddell, Standard Steel Works, Chicago, Ill.
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- J. B. Roach, A. B. I., C. B. & Q. Ry., Aurora, Ill.
- J. M. Robb, M. M., Chicago Great Western Ry., Chicago, Ill.
- C. A. Roberts, Crerar, Adams & Co., Chicago, Ill.
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- Jay G. Robinson, Railway Supplies, Chicago, Ill.
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- Lew Rock, Ada, Okla.
- J. F. Roddy, 227 Postal Tel. Bldg., Chicago, Ill.
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- Roe Julian, Crocker-Wheeler Co., Chicago, Ill.
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- W. W. Rosser, The T. H. Symington Co., Chicago, Ill.
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- Jas. Ryan, Engr., C. & W. I. R. R., Chicago, Ill.
- W. M. Ryan, McCord & Co., Chicago, Ill.
- J. H. Sabin, Rockford, Ill.
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- Anthony Saddler, Foreman Boiler Maker, C. & N. W. Ry., So. Kaukauna, Wis.
- C. S. Sale, Blount Plow Works, Evansville, Ind.
- W. W. Salmon, General Railway Signal Co., P. O. Box 1052, Rochester, N. Y.
- C. H. Salmon, Society for Savings Bldg., Cleveland, O.
- N. E. Salsich, Repr., Pennsylvania Steel Co., Chicago, Ill.
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- G. H. Sergeant, 114 Liberty St., New York City.
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- A. Saylor, Loco. Engr., Chicago & Western Indiana Ry., Chicago, Ill.
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- B. R. Seabrook, Western Engineering Co., Los Angeles, Cal.
- E. E. Seyfarth, C. C. to M. M., C. & W. I. Ry., Blue Island, Ill.
- Herman Sewing, Gang. For., C. B. & Q. Ry., W. Burlington, Ia.
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- W. J. Schlacks, Western Sales Agt., McCord & Co., Chicago, Ill.
- F. Von Schlegell, care Allis Chalmers Co., First National Bank Bldg., Chicago, Ill.
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- C. T. Schoen, Schoen Mfg. Co., Philadelphia, Pa.
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- W. C. Scofield, Foreman Blacksmith, Ill. Cent. R. R., Chicago, Ill.
- G. W. Scott, Consulting Engineer, Security Bldg., Chicago, Ill.
- W. R. Scott, Supt. Southern Pacific Ry., San Francisco, Cal.
- H. H. Scovill, Railway Steel Spring Co., Chicago, Ill.

- A. B. Scully, Prest., Scully Iron & Steel Co., Chicago, Ill.
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- J. S. Seeley, Nathan Mfg. Co., Chicago, Ill.
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- J. B. Seymour, National Lock Washer Co., Chicago, Ill.
- W. J. Shadle, C. F., C. & N. W. Ry., Clinton, Ia.
- F. C. Shafer, G. F., New York, Chicago & St. Louis Ry., Chicago, Ill.
- Stewart Shearman, G. F. C. D., L. S. & M. S. Ry., Chicago, Ill.
- W. B. Sharp, Engr., St. Louis & Southwestern Ry., Mt. Pleasant, Texas.
- W. E. Sharp, M. C. B., Armour Car Lines, Chicago, Ill.
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- John Shappard, Asst. Storekeeper, Pullman Co., Chicago, Ill.
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- W. T. Sherman, U. S. Lighting & Heating Co., Chicago, Ill.
- Frank Sherritt, Imperial Car Cleaner Co., Chicago, Ill.
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- Chas. Shults, Coatesville Rolling Mill Co., New York City.
- F. K. Shultz, American Steel Foundries, New York City.
- F. D. Shumate, Old Colony Building, Chicago, Ill.
- A. K. Shurtleff, Office Engr., C. R. I. & P. Ry., Chicago, Ill.
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- E. DeSilva, M. M., Santa Fe, Prescott & Phoenix Ry., Prescott, Ariz.
- P. R. Simmonds, Green-Tweed & Co., Chicago, Ill.
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- J. E. Simmons, Railway Supplies, 505 Fisher Bldg., Chicago, Ill.
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- W. M. Simpson, Ry. Material Co., Chicago, Ill.
- Angus Sinclair, Editor, Railway & Locomotive Engineering, 114 Liberty St., New York City.
- Jos. Sinkler, Franklin Ry. Supply Co., Chicago, Ill.
- B. F. Sipp, 50 St. James Place, Chicago, Ill.
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- H. W. Slaughter, 9802 Normal Ave., Chicago, Ill.
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- E. F. Smith, Repr., Baeder, Adamson & Co., Chicago, Ill.
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- P. F. Smith, Jr., M. M., Pennsylvania Lines West, Columbus, O.
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- R. E. Smith, G. S. M. R., A. C. L. R. R., Wilmington, N. C.
- S. L. Smith, National Mall. Castings Co., Cleveland, O.
- S. S. Smith, M. M., Chicago & Milwaukee Electric Ry., Highwood, Ill.
- W. A. Smith, Manhattan Bldg., Chicago, Ill.
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- W. R. Smith, Foreman, C. & N. W. Ry., Chicago, Ill.
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- Andrew Speirs, American Car & Fdy. Co., Chicago, Ill.
- V. K. Spicer, Union Switch & Signal Co., Chicago, Ill.
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- R. E. State, R. H. F., C. R. I. & P. Ry., Blue Island, Ill.
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- W. A. Stearns, M. E., Louisville & Nashville Ry., Louisville, Ky.

- W. P. Steele, American Loco. Co., New York City.
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- C. N. Stevens Asst. Mgr., Barrett Mfg. Co., Chicago, Ill.
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- M. D. Stewart, Fitz-Hugh-Luther Co., Chicago, Ill.
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- C. F. Street, Westinghouse, A. B. & Co., Wilmerding, Pa.
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- Fred Studer, G. F., C. & E. I. R. R., Brazil, Ind.
- R. Sturgis, C. B. & Q. Ry., Sheridan, Wyo.
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- E. H. Symington, G. W. S. M., T. H. Symington Co., Chicago, Ill.
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- Chas. Talbott, Westinghouse Electric & Mfg. Co., Chicago, Ill.
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- W. C. Talmage, Railway Steel Spring Co., Cleveland, O.
- R. Tawse, S. M. P., D. T. & I. Ry., Toledo, O.
- W. G. Tawse, R. F. E., C. & E. I. R. R., Moline, Ill.
- A. A. Taylor, Fairbanks, Morse & Co., Chicago, Ill.
- A. Z. Taylor, Car Foreman, C. M. & St. P. Ry., La Crosse, Wis.
- C. H. Taylor, Mach. Shop Foreman, Armour Car Lines, Chicago, Ill.
- E. D. Taylor, L. S. & M. S. Ry., Chicago, Ill.
- J. W. Taylor, 390 Old Colony Building, Chicago, Ill.
- O. N. Terry, C. B. & Q. Ry., Lincoln, Neb.
- W. B. Templeton, Prest., Templeton-Kenly Co. Ltd., Chicago, Ill.
- E. W. Tetlow, Salesman, Western Tube Co., Chicago, Ill.
- A. E. Thomas, G. F. L. D., Chicago Great Western Ry., Oelwein, Ia.
- C. E. Thomas, G. F., Ill. Cent. R. R., Chicago, Ill.
- H. T. Thomas, M. M., Detroit & Macinac Ry., East Tawas, Mich.
- E. B. Thompson, A. S. M. P., St. P. M. & O. Ry., St. Paul, Minn.
- Geo. Thompson, G. F., L. S. & M. S. Ry., Elkhart, Ind.
- J. B. Thompson, Loco. Engr., Chicago & Western Indiana Ry., Chicago, Ill.
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- W. H. Traver, Chicago Pneumatic Tool Co., Chicago, Ill.
- O. G. Trielaff, T. E., Ill. Cent. R. R., Chicago, Ill.
- E. L. Troxell, Loco. Engr., Chicago & Western Indiana Ry., Chicago, Ill.
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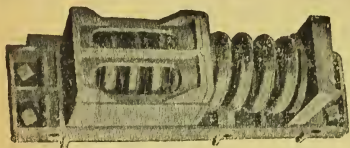
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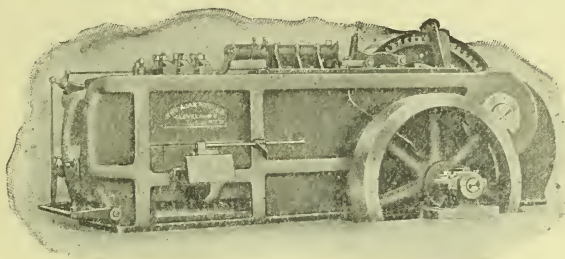
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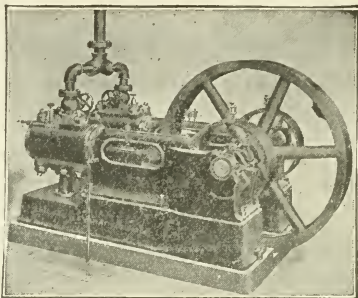
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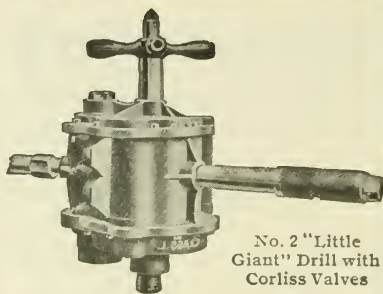
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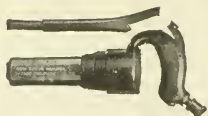
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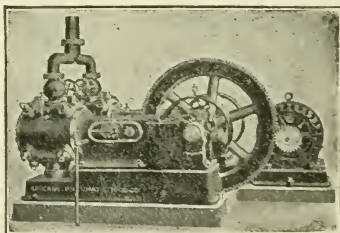
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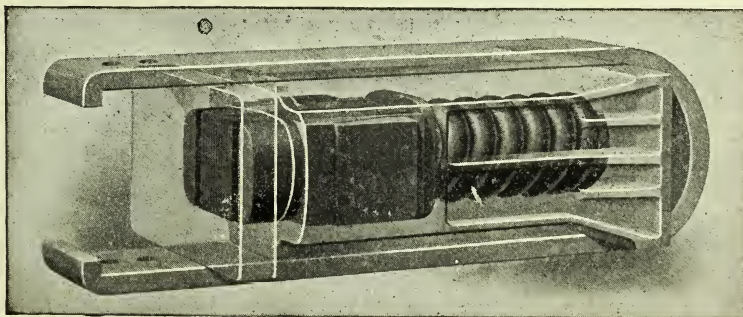
WORKS

Axle Forge, Depew, N. Y.

Malleable Iron,

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Gould Friction Draft Gear

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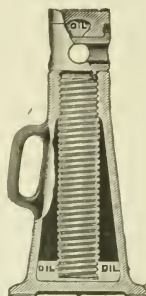
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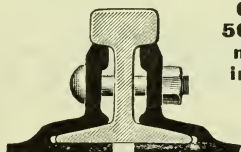
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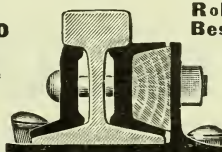
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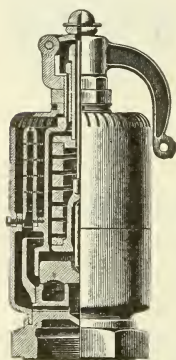


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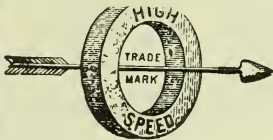
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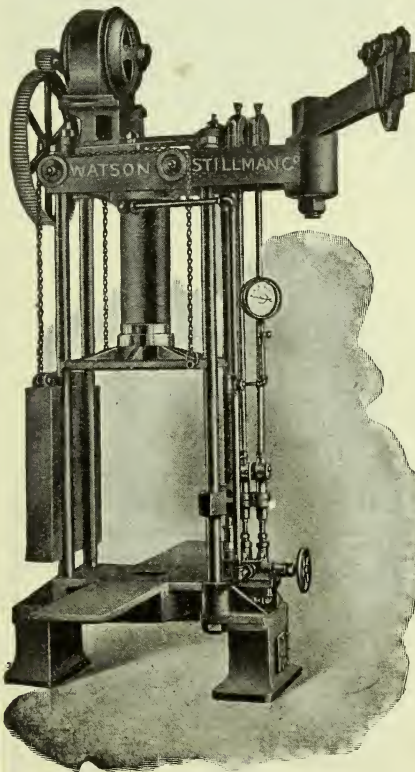
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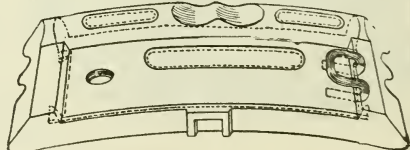
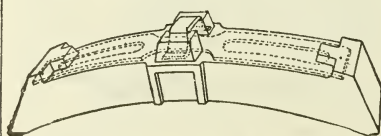
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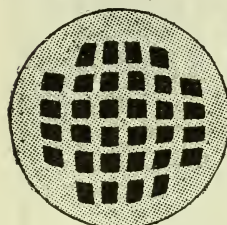
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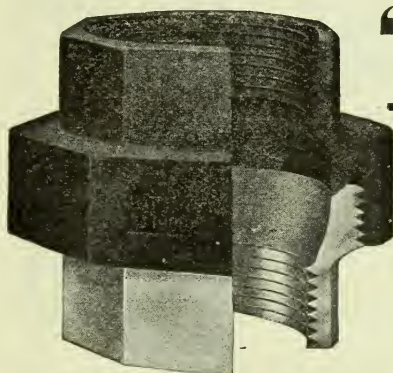
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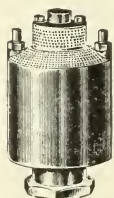
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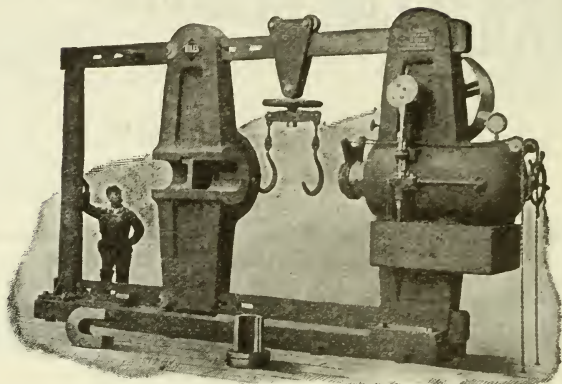
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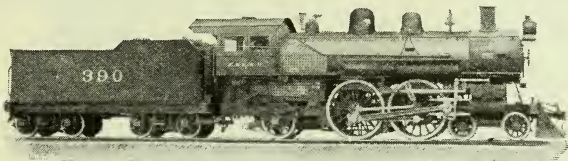
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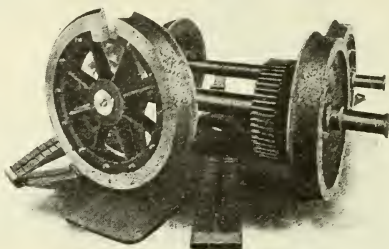
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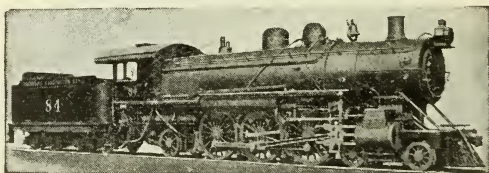
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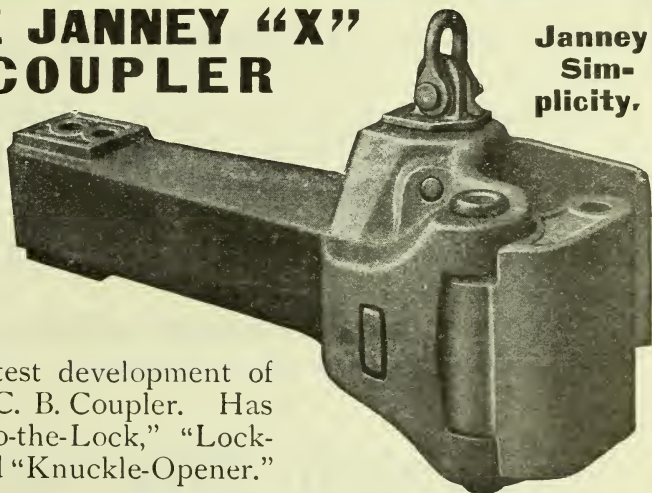
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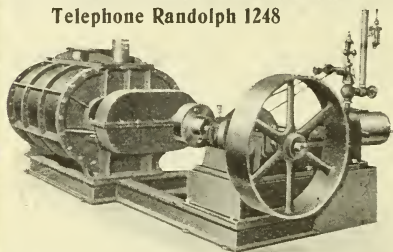
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